

chapter three

Residential Properties

This chapter addresses residential properties over the 10-year period from 1992 to 2001, with specific focus on 2001. Significant changes from the last published statistics on residential properties—the 12th Edition, 1989–1998—are noted. Residential properties are discussed in four sections: an overview of all residential structures, one- and two-family homes (including mobile homes used as fixed residents, a subset of one- and two-family dwellings), apartments, and other residences such as rooming houses, hotels/motels, and other property types reported as residences.

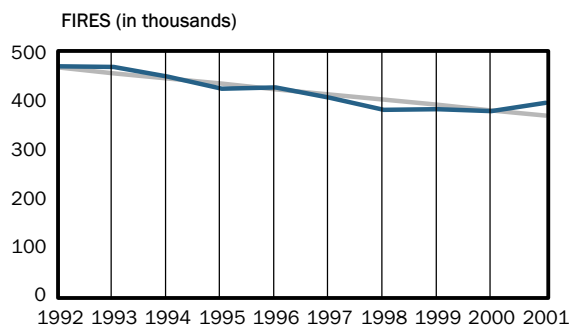
OVERVIEW

The residential portion of the fire problem continues to account for the vast majority of civilian casualties. NFPA estimates reflect that 84 percent of fire deaths and 77 percent of fire injuries are in residential structures.¹ This section reviews the residential fire problem overall. Subsequent sections of this chapter present details of the fire problem for major subcategories of residential properties (one- and two-family structures, apartments, and other types).

The term *residential* as used in NFIRS includes what is commonly referred to as homes, whether they are one- or two-family dwellings or multifamily apartment buildings. It also includes manufactured housing, hotels and motels, residential hotels, dormitories, and much of what might be considered “halfway houses” for the care of people with problems but who are able to operate in the community. The term does not include institutions such as prisons, homes for the elderly, juvenile care facilities, or hospitals, though many people may reside in them for short or long periods of time.

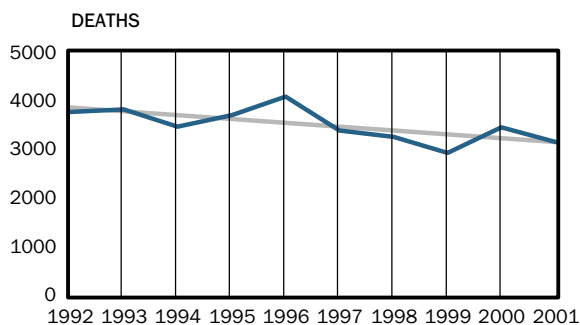
Figure 21, based on the NFPA annual surveys of fire departments, shows the 10-year trend in residential fires, deaths, injuries, and dollar loss. The trend in number of residential fires, deaths, and injuries declined 21, 19, and 29 percent, respectively. These decreases continue the downward trends estimated in past editions of this report. The decreases would be even greater if they were weighted against the number of residences that existed in 1992 versus the much higher number in 2001. Property losses, which had been declining, increased 6 percent over the 1992–2001 period. This increase may be attributed to the change in the way NFIRS 5.0 collects property losses. NFIRS 5.0 includes separate estimates for the value and loss of the building and its contents; NFIRS 4.1 provided one overall estimate.

¹ These percentages are derived from summary data presented in NFPA’s annual survey, 2001.



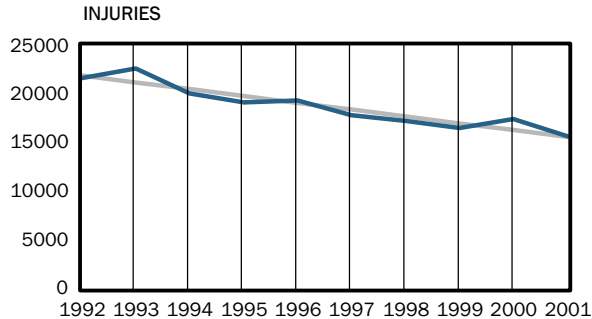
1992	472.0	1997	406.5
1993	470.0	1998	381.5
1994	451.0	1999	383.0
1995	425.5	2000	379.5
1996	428.0	2001	396.5

10-Year Trend = -21.0%



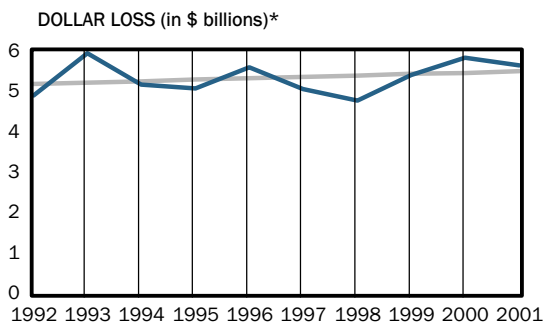
1992	3,765	1997	3,390
1993	3,825	1998	3,250
1994	3,465	1999	2,920
1995	3,695	2000	3,445
1996	4,080	2001	3,140

10-Year Trend = -18.5%



1992	21,600	1997	17,775
1993	22,600	1998	17,175
1994	20,025	1999	16,425
1995	19,125	2000	17,400
1996	19,300	2001	15,575

10-Year Trend = -28.9%



1992	\$4.90	1997	\$5.06
1993	\$5.94	1998	\$4.77
1994	\$5.16	1999	\$5.41
1995	\$5.07	2000	\$5.84
1996	\$5.60	2001	\$5.64

10-Year Trend = +6.1%

*Adjusted to 2001 dollars

Sources: NFPA and Consumer Price Index

Figure 21. Trends in Residential Fires and Fire Losses

Because an average of 3,500 civilians die, 18,700 are injured, and property losses amount to an annual average of \$5.34 billion, the fire problem in U.S. residences is of significant concern.

Types of Residences

Figure 22 shows the relative proportions of fires and losses among the three major residential categories in 2001. (Each of these categories is discussed in subsequent sections of this chapter.) The percentages shown are relatively consistent over each of the previous 9 years.²

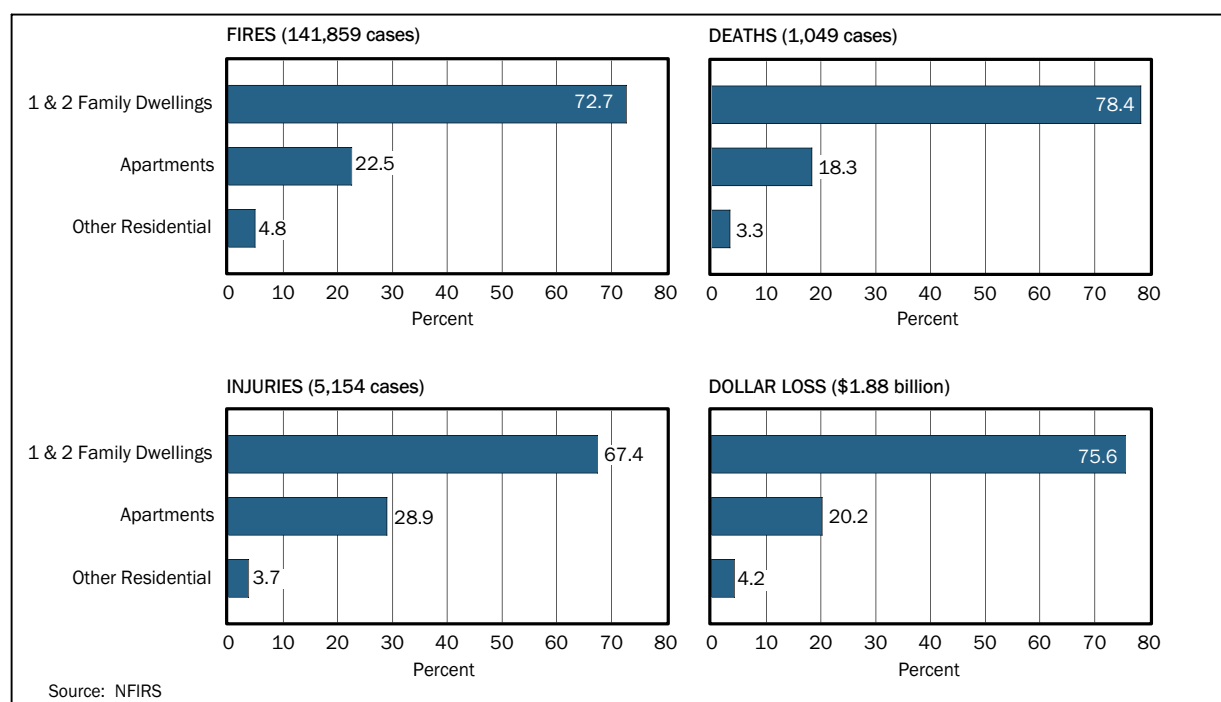


Figure 22. Residential Fires and Fire Losses by Property Type (2001)

One- and two-family dwellings, where the majority of the U.S. population live, dominate the residential statistics: 73 percent of residential fires, 78 percent of residential fatalities, 67 percent of residential injuries, and 76 percent of residential dollar loss. Manufactured housing, a subset of one- and two-family structures, are included in these statistics.³

Apartments account for 23 percent of residential fires, 18 percent of residential deaths, 29 percent of injuries, and 20 percent of residential dollar loss. The relatively high incidence of injuries in apartments may be because the total space is significantly less in apartments than in dwellings, and people are more quickly exposed to fire products than in a house. Other factors

² The analyses in this chapter exclude information from NFIRS on two unconfirmed large loss fires. The combined losses from these two fires was reported at \$190 million.

³ In this report, *manufactured housing* includes only mobile homes situated on semipermanent sites and used as fixed residences.

may also influence apartment injuries. Potential deaths could become injuries because apartments may be built to strict codes, sprinklers may be installed, or smoke alarms may be hardwired to a fire station that generates an automatic fire department response when the alarm goes off.

Other residential properties (mostly hotel and motel fires) account for between 3 and 5 percent of the residential fire problem in the various measures.

Causes

Figure 23 shows the causes of fires, deaths, injuries, and dollar loss in 2001. These statistics are driven by the one- and two-family dwelling property type, which accounts for the majority of residential fires. As a result, the overall residential figures and those for one- and two-family dwellings (Figure 34) are quite similar. Larger differences from the overall residential causes are found as one looks at the smaller subcategories of residences—apartments, mobile homes used as fixed residences, and hotels/motels.

With the introduction of limited reporting of confined, no-loss structure fires in NFIRS 5.0, the cause profiles for structure fires, especially residential structure fires, have undergone an important change. This new reporting feature allows the fire service to capture incidents where the fire was confined to the vessel or object of origin and caused no loss. These are fires that are thought to have gone unreported prior to the introduction of NFIRS 5.0 or were reported, but as a nonfire fire incident as no loss was involved. These confined fires, generally of three types (cooking, heating related (primarily chimney), or trash related), now account for 18 percent of residential fires. Cooking (11 percent) and heating-related (5 percent) confined fires account for 16 of this 18 percent. As a result, cooking and heating fires show increases—cooking fires show large increases while heating fires show more modest ones.

Cooking has been the leading cause of residential fires most of the years since the inception of NFIRS. In 2001, largely as a result of confined cooking fires, cooking fires were double that of the next leading cause. Heating passed cooking for a few years in the late 1970s when there was a surge in the use of alternative space heaters and wood heating, but that heating problem has since subsided. Not surprisingly, cooking is also the leading cause of fire injuries, nearly twice that of the next leading cause. Many cooking fires come from unattended cooking where grease or oil ignites or flammable materials in proximity to burners catch fire. These fires can be lessened by emphasizing the importance of vigilance while cooking and by informing the public on how to extinguish small cooking fires (e.g., cover with a pot lid, douse it with baking soda). Wearing loose-fitting clothing such as bathrobes can be dangerous around cooking areas. Cooking in 2001 is the third leading cause of fire deaths, as it was in 1998.

Incendiary and suspicious, which is called “arson” here even though that term has a narrower legal definition, is the leading cause of dollar loss, the second leading cause of deaths, and the third leading cause of fires and injuries in residences. That arson is so prominent a factor in the residential fire problem may be a surprise to many. There are a number of factors to residential arson fires—vandalism, revenge, fraud, and quarrels are common motives according to fire

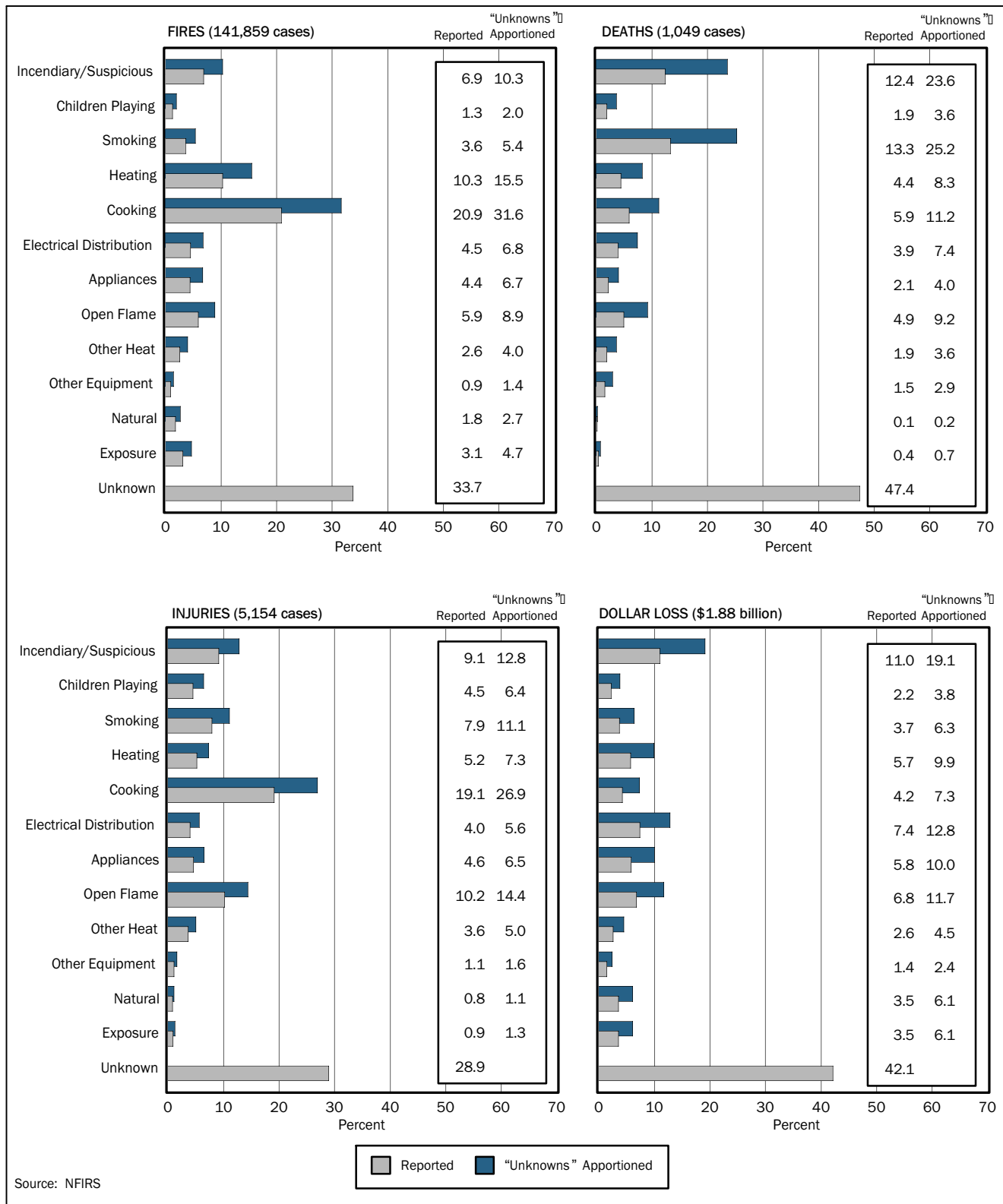


Figure 23. Causes of Residential Fires and Fire Losses (2001)

officials. Because of advances in criminal forensics, the use of arson to conceal crimes is yet another motive.⁴ Part of the reason for the increase in the rank order of arson fires is the success in reducing accidental and careless fires, or detecting them early enough so that they are not reported to NFIRS.

There is little change in 2001 property losses from 1998. Arson and electrical distribution continued as the first and second leading causes, respectively.

Heating, the second leading cause of residential fires, includes those fires where the equipment involved in ignition is central heating, fireplaces, portable space heaters, fixed room heaters, wood stoves, and water heating. The central heating and water heater portions of the problem have remained relatively steady, while the portable space heater and wood burning stove portion of the problem, along with chimney fires, rose very sharply from the late 1970s to the early 1980s but has since abated.

As in all previous years, smoking is the leading cause of residential fire deaths (and fire deaths overall), accounting for one-quarter of all fatalities. The percentage of smoking deaths increased slightly since 1998. Smoking is fourth in injuries and seventh in fires and dollar loss. Smoking deaths may be higher than the other measures because the careless smoker has fallen asleep or is incapacitated and unable to escape the ensuing fire.

It is important to note that the leading causes are different depending on what measure is used, as can be seen from Figure 23. Table 12 displays the top three causes of each measure for 2001 and compares this ranking with those of 1996 and 1998. Two causes are included for the first time in the top three groupings. Open flame fire injuries jumped from fifth in 1998 to second place and its property loss moved to third place.

Table 12. Leading Causes of Residential Fires and Fire Losses (2001)

[Numbers in parentheses reflect the 1996/1998 rankings]

Rank	Fires	Deaths	Injuries	Dollar Loss
1	Cooking (1/1)	Smoking (1/1)	Cooking (1/1)	Arson (1/1)
2	Heating (2/3)	Arson (3/2)	Open Flame (6/5)	Electrical (3/2)
3	Arson (3/2)	Cooking (5/3)	Arson (3/2)	Open Flame (5/5)

Sources: NFIRS and 11th and 12th Editions, *Fire in the United States*

Cause Trends

Figure 24 (four pages) shows the trends in the causes of residential fires and fire losses over the years 1992–2001. Table 13 shows the 10-year trend increase or decrease for each cause.

⁴ Motives were not reported in NFIRS 4.1, but are included in NFIRS 5.0. However, this report does not examine the NFIRS 5.0 data on arson motives.

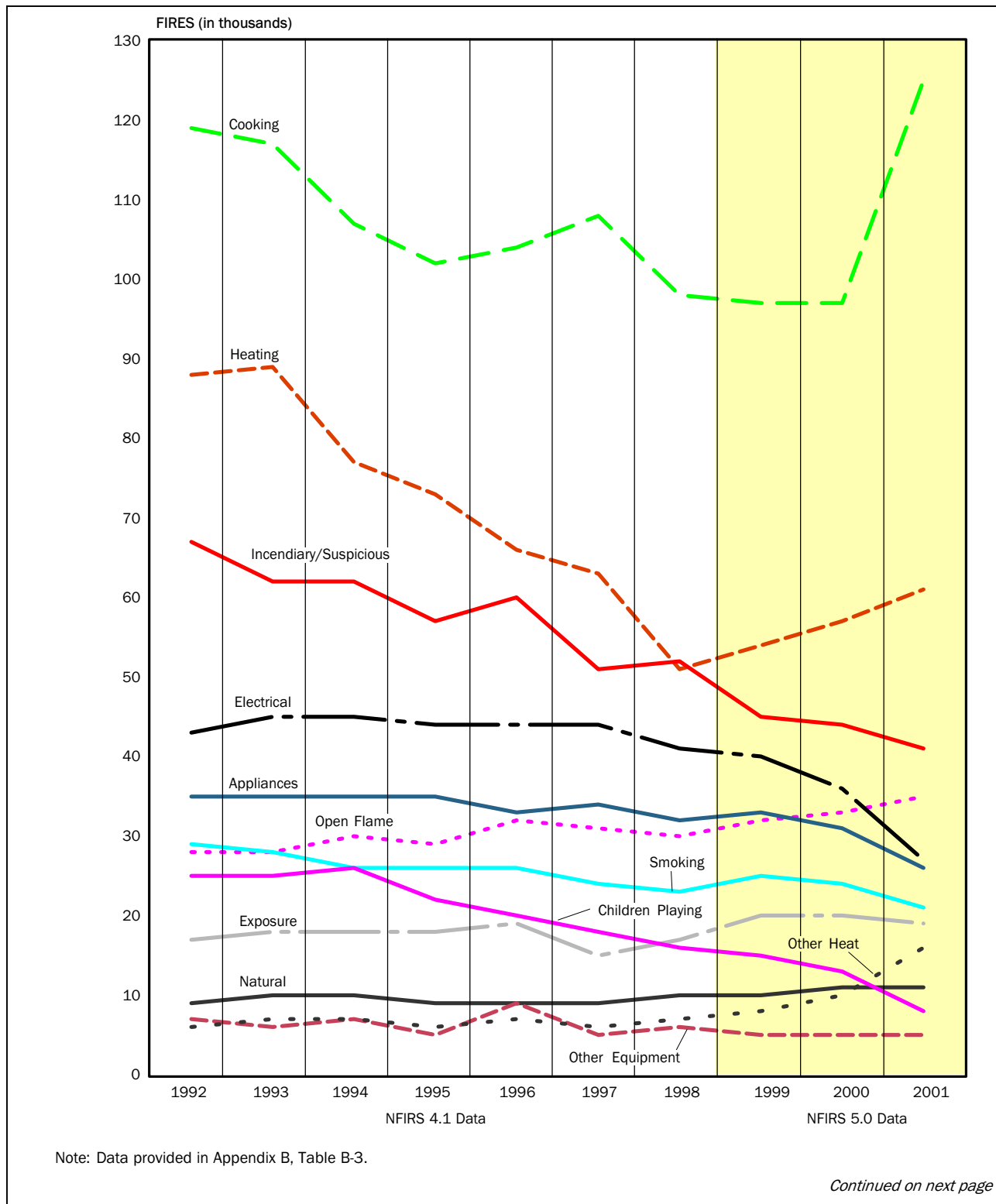


Figure 24. Trends in Causes of Residential Fires and Fire Losses

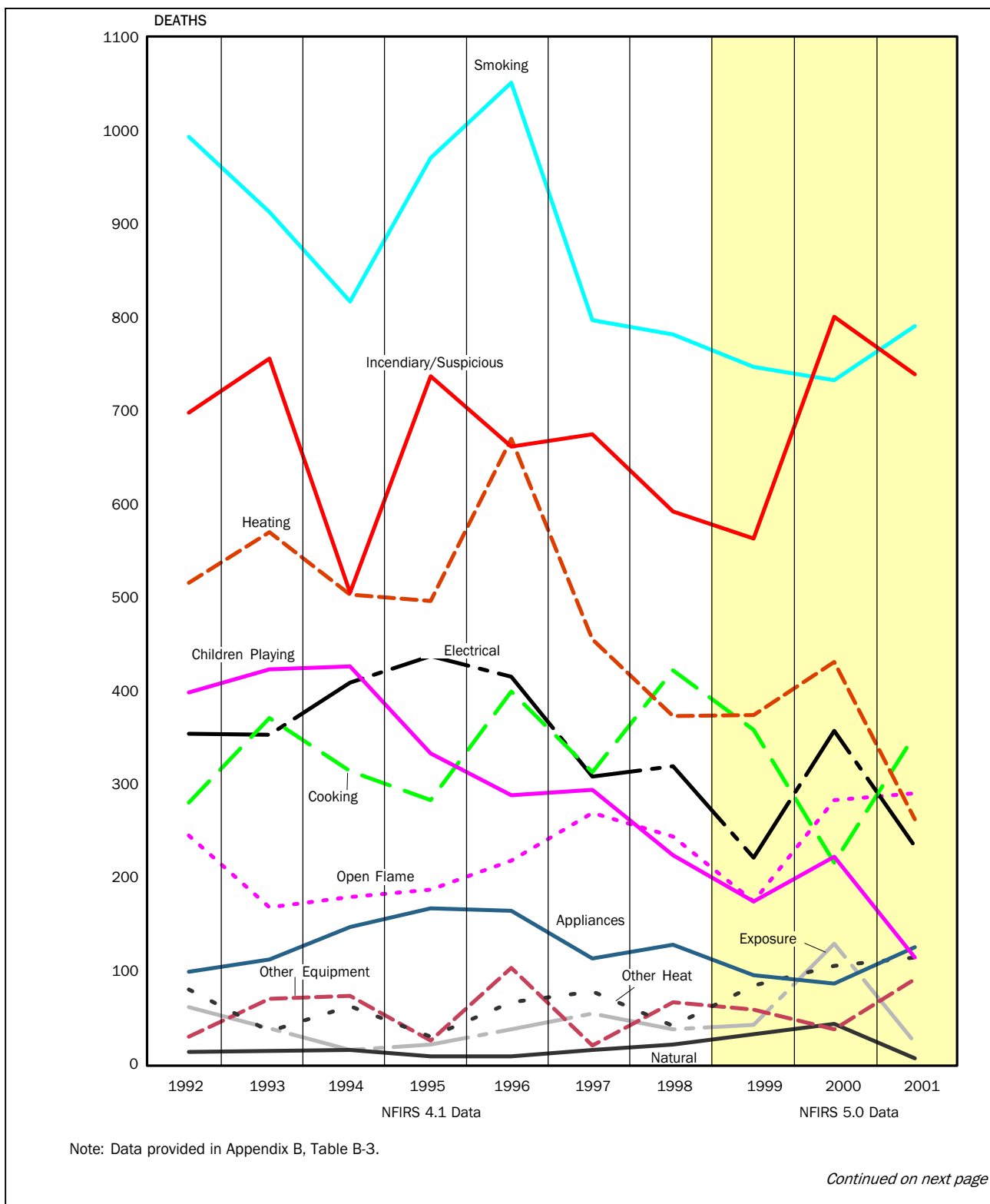


Figure 24. Trends in Causes of Residential Fires and Fire Losses (cont'd)

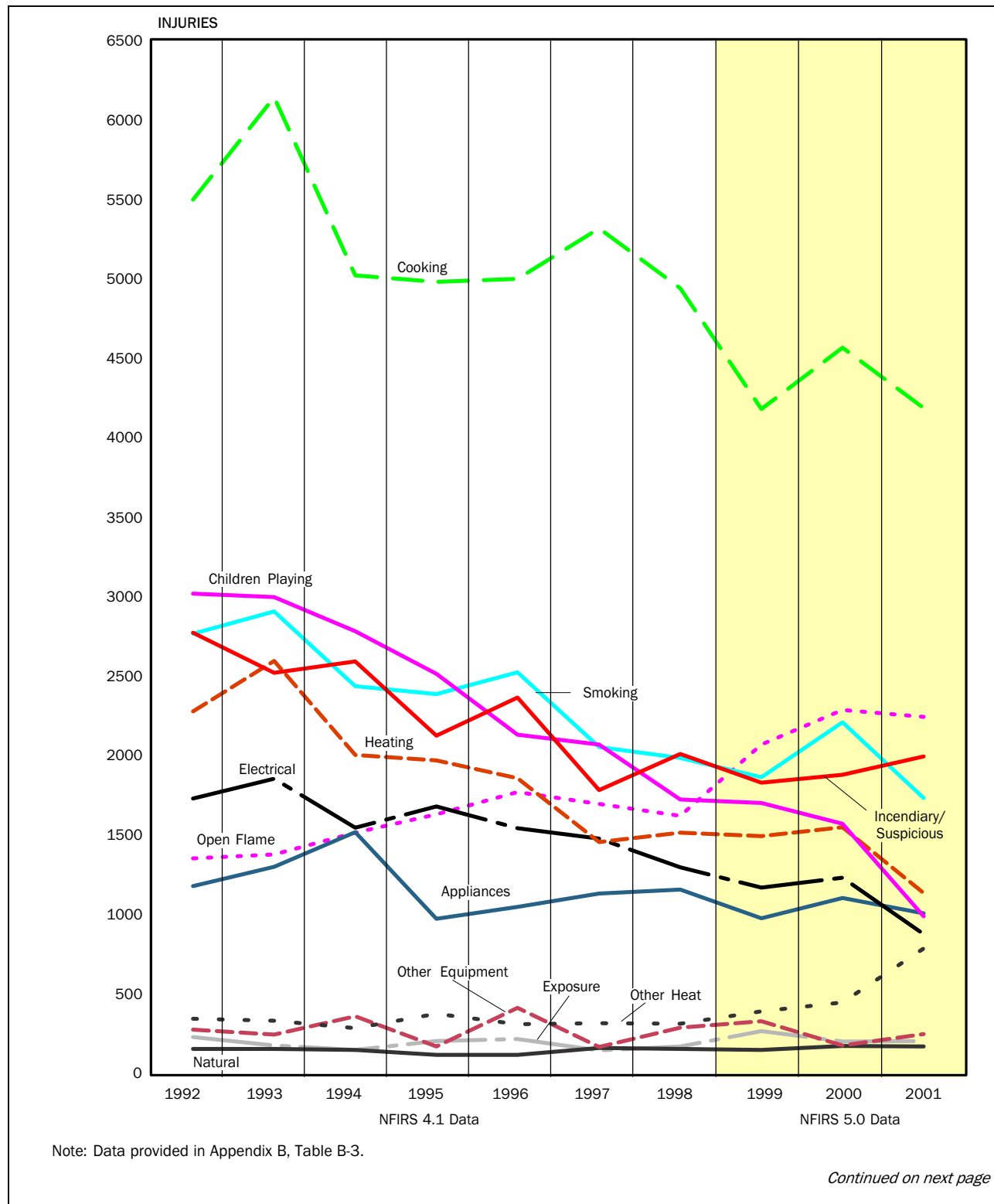


Figure 24. Trends in Causes of Residential Fires and Fire Losses (cont'd)

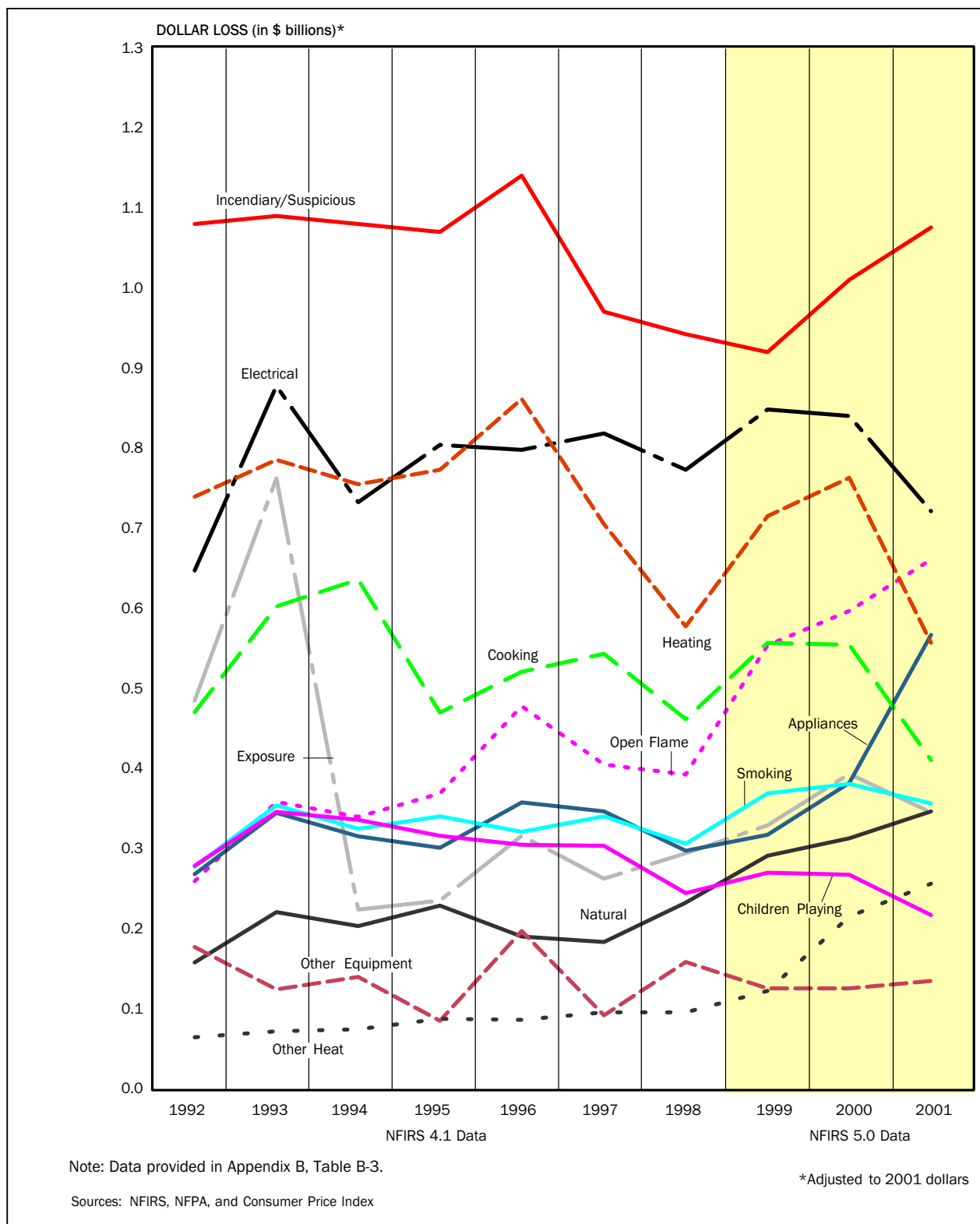


Figure 24. Trends in Causes of Residential Fires and Fire Losses (cont'd)

Table 13. Trends in Causes of Residential Fires and Losses (1992–2001) (percent)

Cause	Fires	Deaths	Injuries	Dollar Loss
Incendiary/Suspicious	-38.3	+4.6	-33.7	-9.8
Children Playing	-62.8	-68.6	-62.8	-27.1
Smoking	-21.8	-23.8	-36.5	+18.4
Heating	-41.2	-41.7	-50.2	-18.8
Cooking	-7.0	+2.0	-25.6	-12.4
Electrical Distribution	-27.7	-32.9	-44.5	+6.5
Appliances	-18.7	-15.3	-15.2	+59.4
Open Flame	+21.1	+41.0	+72.1	+129.4
Other Heat	+132.1	+119.9	+112.4	+472.3
Other Equipment	-20.7	+32.3	-14.9	-12.5
Natural	+11.3	+146.2	+17.5	+94.6
Exposure	+8.8	+83.9	+11.4	-38.6

Sources: NFIRS, NFPA, and Consumer Price Index; data provided in Appendix B, Table B-3.

All of these trends would appear lower if presented as per capita rather than in the absolute because the population increased by an estimated 11 percent over the 10 years. Therefore, an upward trend that is less than the population increase or any downward trend reflects an improvement to the overall fire problem. One significant change is that, starting in 1994, the hotel/motel category began to be counted under other residences because the magnitude of the hotel/motel fire problem had dropped so much as to not merit a separate category. Therefore, certain trend data could not be reported for the hotel/motel category after 1994.

Cooking fires remain the leading cause by a widening margin. There was a modest downward trend in cooking fires until 2000, but they increased to their highest level in 2001. Heating fires decreased considerably from 1992 to 1998, but in the 3 years since they have steadily risen. Much of this increase is a result of the inclusion of confined cooking and heating fires. Heating, the second highest cause of fires in 9 of the past 10 years, trended down 41 percent. Arson fires have been in third place for 9 of the past 10 years, but the 10-year trend is down 38 percent; as will be seen, however, arson deaths are up and property losses due to arson are considerably higher than any other cause. An encouraging trend is children playing fires, which has trended down 63 percent and is more than three times less in 2001 than in 1992. Along with the reduction in children playing fires is the reduction in deaths from these fires—69 percent. As a reminder, however, the 1999 to 2001 cause data are derived from the new NFIRS 5.0 data. Subtle definitional changes may result in the data not being directly equivalent.

Smoking and arson are the number one and two causes of deaths by very wide margins over the next leading cause even though the number of fires for both have trended down over 10 years (22 and 38 percent, respectively). Deaths from heating and children playing causes reached their lowest levels in 2001—and decreased 42 and 69 percent, respectively.

Injuries from cooking fires are down 26 percent, but they still are nearly double those of the next leading cause. Open flame injuries catapulted from the seventh leading cause in 1992 to

the second leading cause in 2001, increasing 72 percent. Arson is the third leading cause of injuries in 2001. As with the number of fires, children playing injuries have fallen steeply (63 percent). Heating injuries continued falling over the 10 years, and they reached their lowest point in 2001, half the number reported in 1992.

Dollar losses from fires fluctuate widely.⁵ Arson has always been the leading cause of dollar loss. Heating losses continue their decline (19 percent), dropping to its lowest level in 2001. Since 1998, losses from open flame fires have soared so that they are nearly tied with electrical distribution for the second leading cause; the trend is up 129 percent. In 2001, losses from appliance fires also increased substantially—more than double the losses reported in 1992.

Table 13 shows significant trend increases in several areas. Other heat fires, deaths, and injuries are up more than 100 percent and dollar losses are up more than 400 percent. Dollar losses due to open flame and natural causes are also up considerably. These increases may be the result of definitional changes in NFIRS 5.0 or increased attention to reporting property losses in wildland fires. This area needs to be investigated further.

Smoke Alarm Performance

The term *smoke alarm* encompasses a variety of devices intended to warn occupants of the presence of fire. Smoke alarms are thought to play a significant role in the decrease in reported fires and fire deaths since their installation and use began to increase in the mid 1970s. From national surveys, we know that more than 90 percent of U.S. households have at least one smoke alarm.⁶ It appears, however, that only 39 percent of households that had fires were reported to have alarms (Figure 25).⁷ Considering only the incidents where smoke alarm performance was

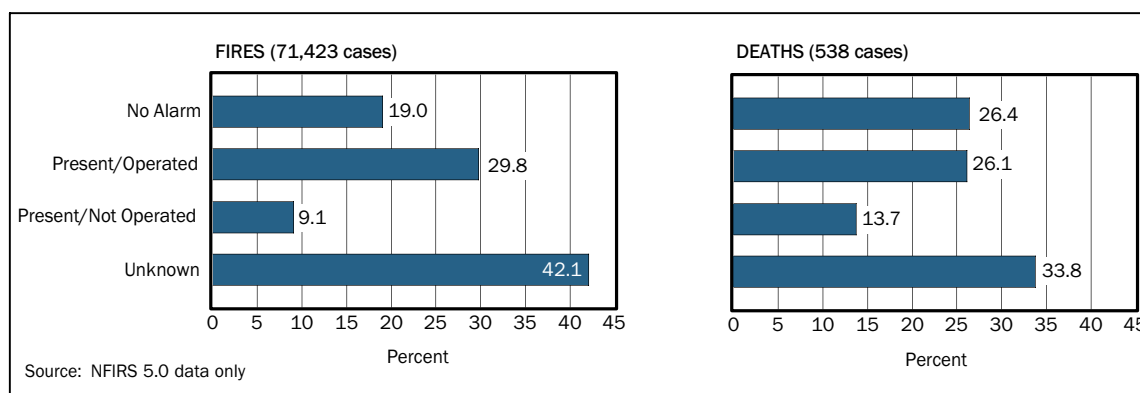


Figure 25. Smoke Alarm Performance in Residences (2001)

⁵ When analyzing dollar loss trends, any precipitous increases must be checked to see if they might be due to errors in entering data for one or two fires. As noted earlier, two unconfirmed large loss fires are not included in these analyses.

⁶ The Smoke Detector Operability Survey Report on Findings, Consumer Product Safety Commission, Revised 1999.

⁷ The figure represents a much smaller subset of incidents than in previous editions of this report. The use of NFIRS 4.1 smoke alarm (and sprinklers) data was not easily compatible with NFIRS 5.0 data. Therefore, only NFIRS 5.0 records were considered in this analysis.

reported (adjusted for the unknowns), this percentage rises to 67 percent, still considerably less than the national average. That is, the 10 percent of households without smoke alarms have disproportionately high reported fires, deaths, injuries, and dollar loss. In other words, smoke alarms are less likely to have been installed in households with reported fires. Either people with alarms are more safety conscious or the alarms allow early detection and extinguishment so that fires are not reported. Also, anecdotal evidence suggests that reported fires are more prevalent in older, less well cared for homes, and these are less likely to be equipped with a smoke alarm.

In 2001, smoke alarms operated in 30 percent of fires. Looking at this percentage from the opposite perspective, there was no alarm, the alarm did not operate, or the presence of alarms was unknown in 70 percent of the reported household fires. When only incidents where smoke alarm performance was reported, the percent of operating smoke alarms rises to 51 percent.

When the “unknowns” of Figure 25 are apportioned to the other three categories, alarms were not present in 40 percent of the homes that had fire fatalities in 2001; an additional 21 percent of the deaths occurred in homes where smoke alarms were present but failed to operate. In 39 percent of fire deaths, an alarm did operate—10 percentage points higher than in 1998. This is somewhat disturbing since there is a widespread belief that an operating alarm will save lives. In some of these cases, the alarm may have gone off too late to help the victim, the victim may have been too inebriated or too feeble to react, or the fire may have been too close to the victim.

The presence or absence of alarms was not reported to NFIRS in 42 percent of residential fires. Figure 26 shows the operation of those smoke alarms when they were present. When the unknowns are apportioned, smoke alarms operated in 77 percent of the fires, failed to operate in 14 percent, and the fire was too small to activate the system in 9 percent.

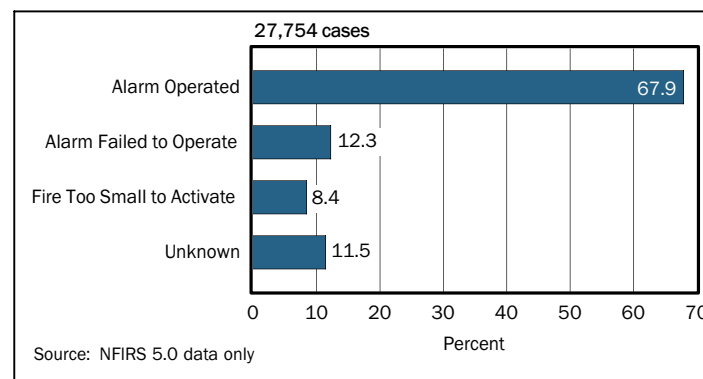


Figure 26. Operation of Smoke Alarms in Fires When Present (2001)

Widespread public education programs that focus on the proper maintenance of alarms are needed to increase both the number of installed smoke alarms and to ensure that they operate properly. A number of initiatives are focused directly on this problem. For example, a message is broadcast nationally when daylight savings time goes into effect reminding the public to check

and maintain their alarms. Some local fire departments in urban areas distribute free smoke alarms to households that are unprotected. These initiatives have all helped, but there are still many non-working alarms in residences that have reported fires.

Presence of Automatic Extinguishing Systems

Other protection types fall in the category of automatic extinguishment systems (AESs). AESs encompass sprinkler, dry chemical, foam, halogen, and carbon dioxide systems. When found in residences, sprinkler systems are the most common type of AESs. Residential sprinklers are found in only a small fraction of residences other than hotels, newer apartment buildings, and newer high-value custom homes today. It is no surprise that they are reported to be present in only a small percentage of residential fires nationally (Figure 27), though they represent a great potential in the future.⁸ In residences, sprinklers are widely thought to be the most effective type of system, not only alerting residents of the presence of fire, but helping to extinguish it. If a fire is extinguished by a sprinkler, it may never be reported.

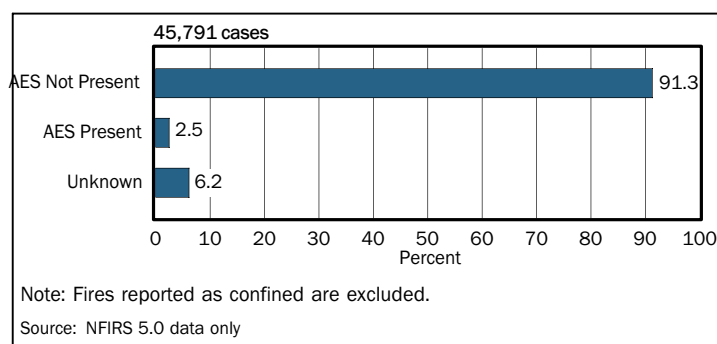


Figure 27. Presence of Automatic Extinguishing Systems in Residential Structures (2001)

When Fires Occur

TIME OF DAY. Fires do not occur uniformly throughout the day, as shown in Figure 28. Residential fire incidents peak from 5:00 to 7:00 p.m., during dinner preparation. Although fire incidents drop when people sleep, deaths are at their highest late at night and in the early morning. More than half of residential fire deaths occur in fires that start from 10:00 p.m. to 6:00 a.m. The peak night hours are from 2:00 to 5:00 a.m. when most people are in deep sleep. A large portion of these early morning deaths are attributed to arson or smoking. Fire injuries occur more uniformly throughout the day, peak slightly during dinner hours when people cook, and again in the early morning hours. Property losses track closely with the number of fires except in the early morning hours from midnight to 6 a.m. when there is a notable separation

⁸ The performance of AESs (i.e., whether they operated or not) could not be determined from the NFIRS 5.0 data in time for inclusion in this report. Also, confined fires are excluded from AES analyses as no AES information is collected for these incidents.

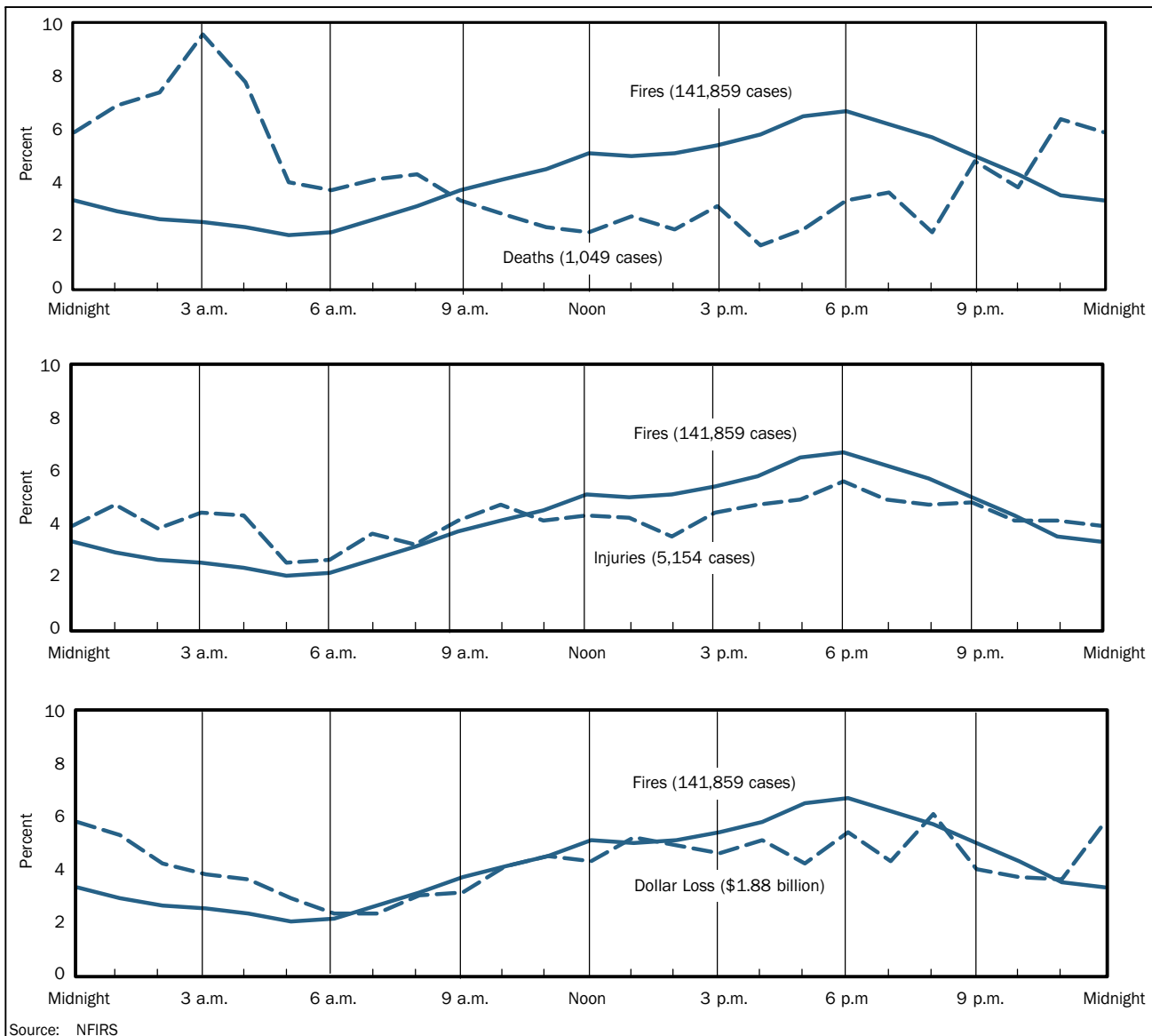


Figure 28. Time of Day of Residential Fires and Fire Losses (2001)

between the two measures. This is partially because residents are asleep so the fire spreads more widely before the fire service is notified. The patterns for fires and losses are largely unchanged from previous years.

MONTH OF YEAR. Residential fires are relatively uniform throughout the year, rising slightly in the winter months. Fire deaths are most frequent during winter months when heating systems add to other causes. Forty percent of all deaths occur in the quarter of the year from December through February (Figure 29). This is essentially the same pattern as in 1998.

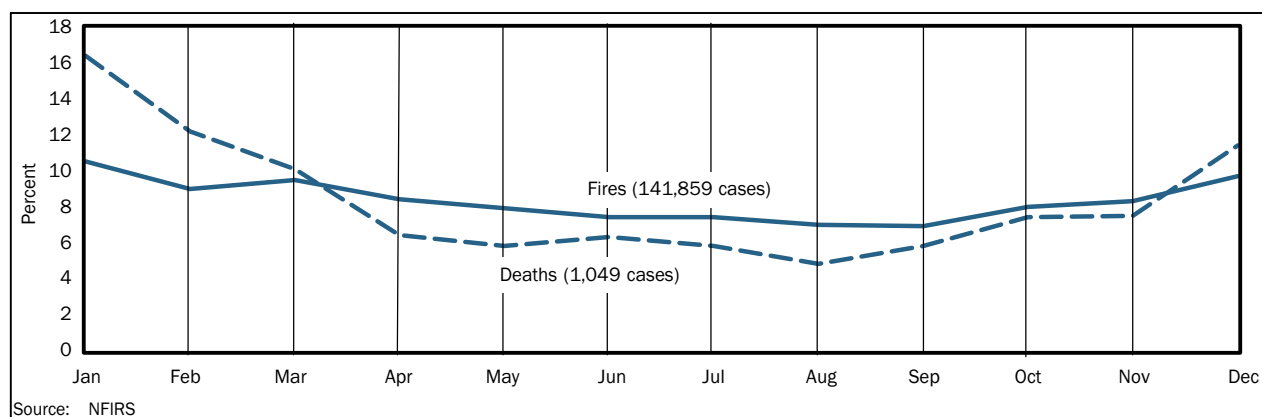


Figure 29. Month of Year of Residential Fires and Fire Deaths (2001)

DAY OF WEEK. There is little discernable difference in the incidence of residential fires by day of the week (Figure 30). Deaths reached their nadir on Tuesdays, but no assumption should be drawn from this fact. Deaths increased marginally over the weekend, a reversal from 1998 deaths.

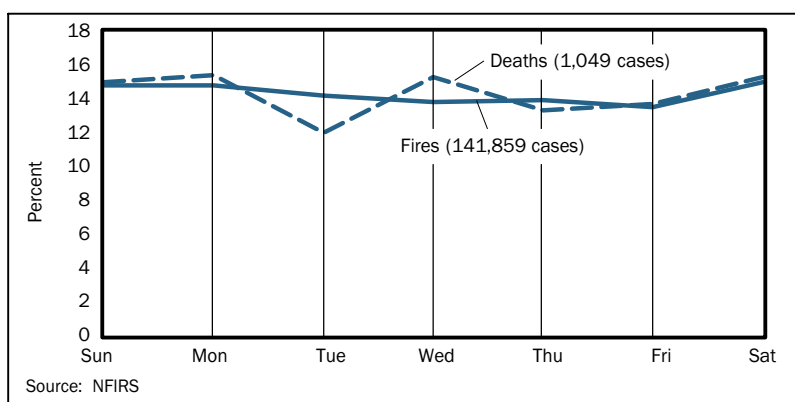


Figure 30. Day of Week of Residential Fires and Fire Deaths (2001)

ONE- AND TWO-FAMILY HOMES

One- and two-family homes are where nearly three-quarters of the people in the United States reside.⁹ The residential fire profile is therefore dominated by this category. Manufactured housing (mobile homes used as fixed residences) is included here in the profiles for one- and

⁹ The U.S. Census Bureau shows that 70 percent of households (81.178 million) are in one-unit attached and detached structures (<http://www.census.gov/hhes/www/housing/ahs/01dtchrt/tab2-1.html> and http://www.census.gov/hhes/www/housing/ahs/ahs01_2000wts/tab1a1.htm). Household size is estimated at 2.59 (http://factfinder.census.gov/servlet/QTTable?_bm=y&-geo_id=D&-qr_name=DEC_2000_SF2_U_QTP10&-ds_name=D&-_lang=en&-redoLog=false). Thus, 81.178 million households x 2.59 people per household = 210.251 million. With the U.S. population given as 285,092,813, 73.4 percent of the population lives in one- and two-family housing.

two-family homes. A separate examination of mobile homes used as fixed residences fires is included at the end of this section.¹⁰

Overview of Trends

As with the residential trends, one- and two-family fires, deaths, and injuries declined during the 10-year period, and property loss increased (Figure 31). Because the number of fires dropped faster than deaths or dollar losses, the statistics per fire worsened. The increased use of smoke alarms has been a major factor in the reduction in the number of reported fires. Fires that are detected early are often extinguished before they are reported to the fire department, so the number of reported fires decreases. When smoke alarms are not present, the fire burns longer before detection and does more damage.

When Fires Occur

TIME OF DAY. Figure 32 mirrors Figure 28 (all residences). Fires and injuries in one- and two-family structures are highest between 5:00 and 7:00 p.m., when cooking fires sharply increase. Fire deaths, on the other hand, peak in the early morning hours, from midnight to 5:00 a.m. The early morning hours are when most people are in deep sleep and do not awaken in time to escape. Deaths during this period are often caused by smoking fires that smolder for several hours and then rapidly increase in smoke production and open flames. Smoke and flames have a greater opportunity to grow larger while people are asleep and unable to respond quickly to warning signs. Arson is also a major cause of these deaths. Dollar loss is relatively consistent with the number of fires throughout the day except between 1:00 and 6:00 a.m.

MONTH OF YEAR. Fires and fire deaths in one- and two-family homes peak in mid winter, when heating fires add to the other types of year-round fires (Figure 33). Deaths are at their lowest in the summer months.

Causes

One-quarter of all fires and injuries in one- and two-family structures are caused by cooking incidents (Figure 34). The most common cooking fires result from unattended cooking, when oil or grease catches fire, and from the ignition of loose clothing.

Heating at 19 percent and arson at 10 percent are the second and third leading causes of fires. Since 1994, the difference between heating and cooking fires has widened, possibly because the use of wood stoves and kerosene heaters has continued to diminish and because of the addition of confined fires (confined cooking fires outnumber confined heating fires by two to one).

The leading cause of death in 2001 is smoking, as in all NFIRS years, at 22 percent. Most of the smoking deaths come from cigarettes dropped on upholstered furniture or bedding.

¹⁰ Detached garages are considered non-residential properties and are discussed in Chapter 4.



Figure 31. Trends in One- and Two-Family Dwelling Fires and Fire Losses

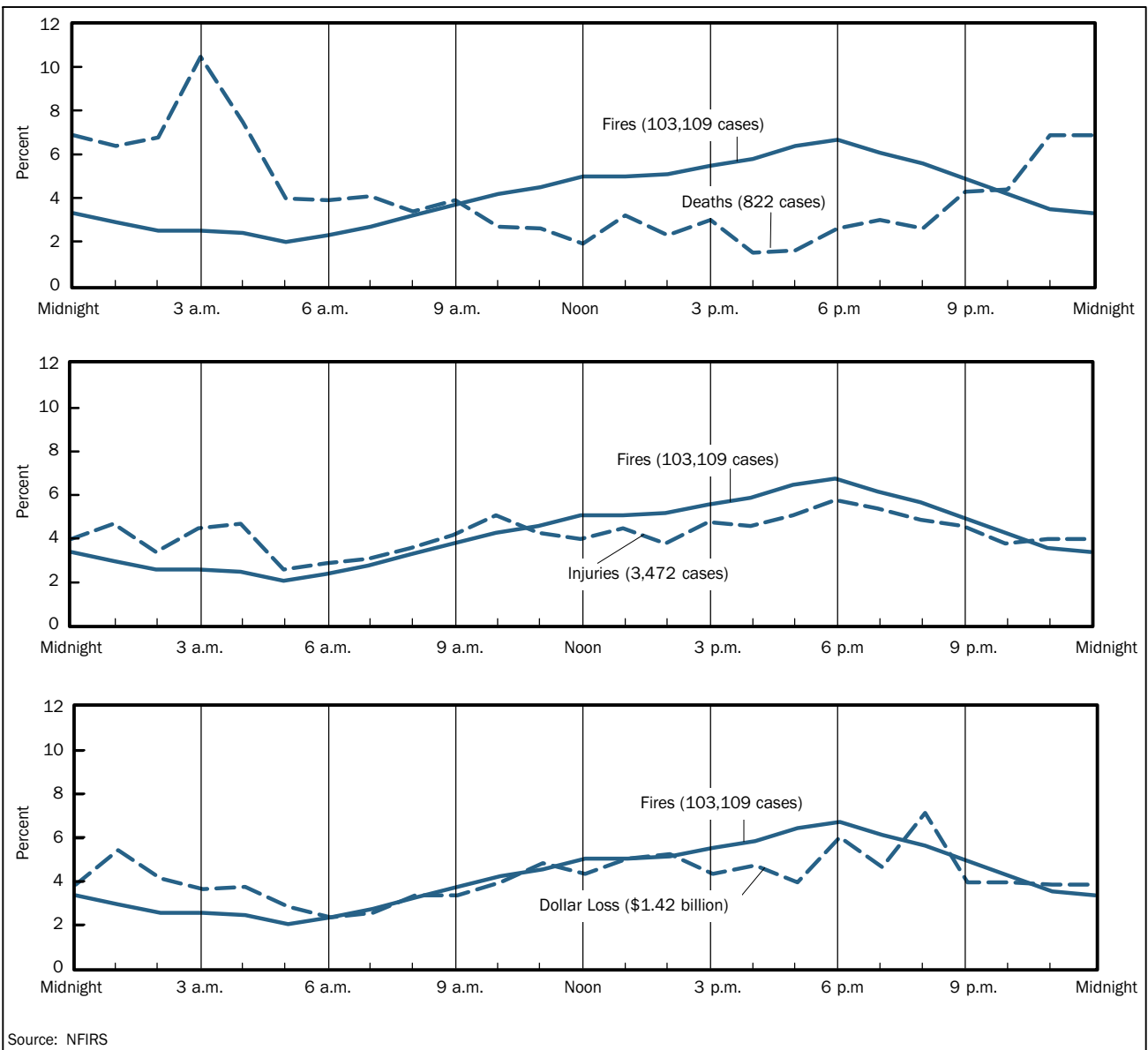


Figure 32. Time of Day of One- and Two-Family Dwelling Fires and Fire Losses (2001)

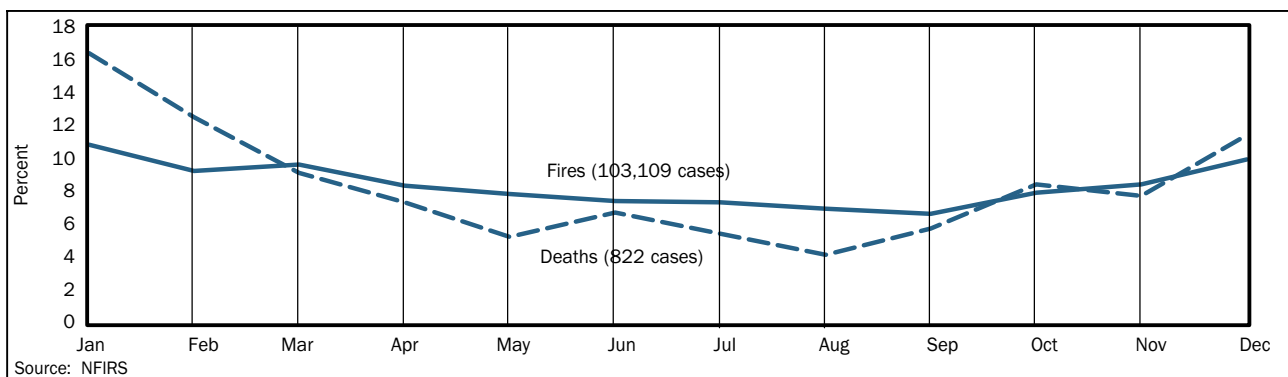


Figure 33. Month of Year of One- and Two-Family Dwelling Fires and Fire Deaths (2001)

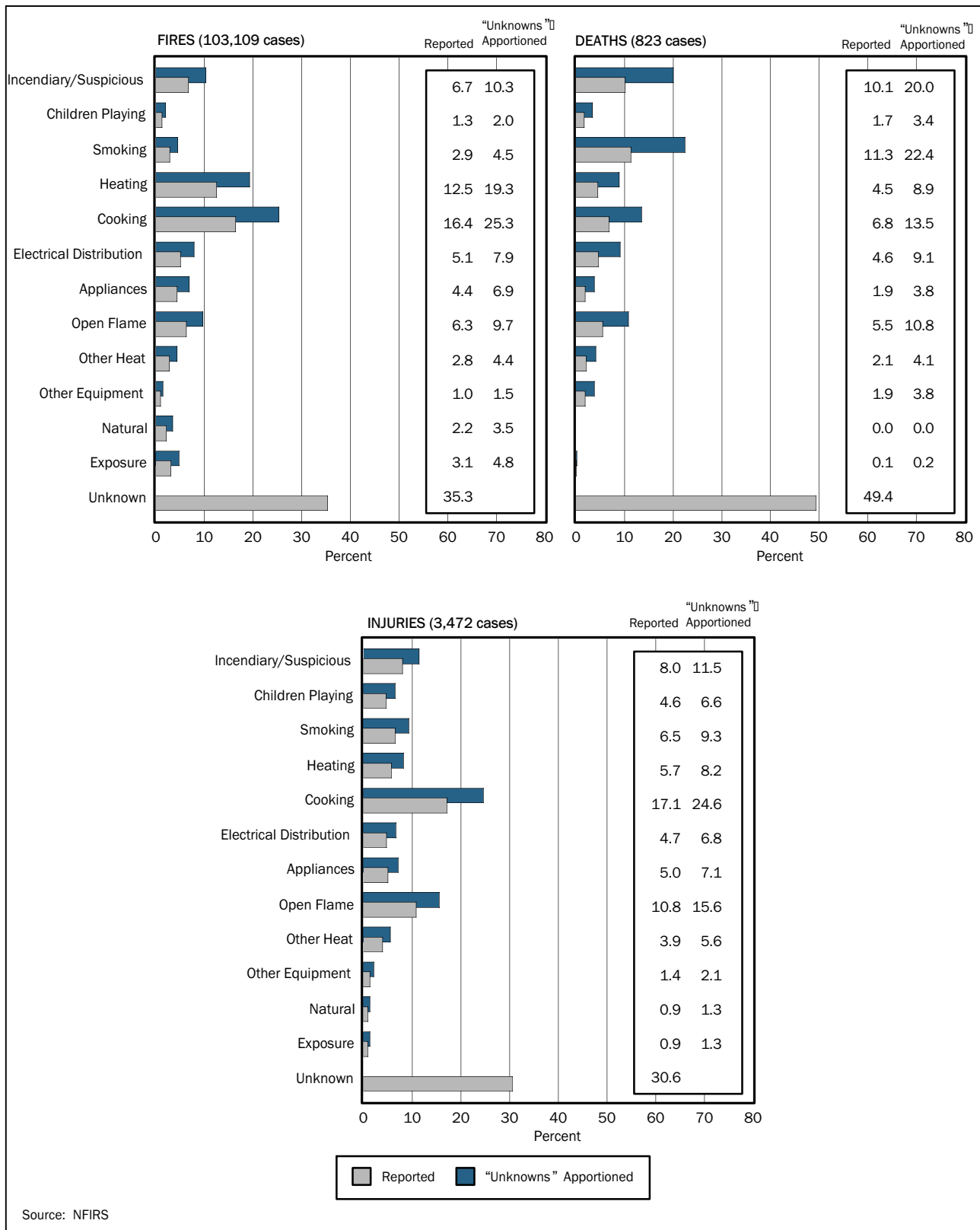


Figure 34. Causes of One- and Two-Family Dwelling Fires and Fire Casualties (2001)

Studies and anecdotal evidence suggest that alcohol consumption may have a role in these fires.¹¹ Arson is the second leading cause of death at 20 percent and cooking is third at 14 percent. These three causes account for more than half of the total 2001 deaths. In 1998, heating was the third leading cause, but it dropped to sixth in 2001.

Open flame fire injuries jumped from the fourth leading cause in 1998 to the second leading cause in 2001, at 16 percent.

Cause Trends

Figure 35 shows the trends for the top five causes of one- and two-family residential fires and casualties in 2001. Table 14 shows the 10-year percentage increases and decreases for each cause. With the introduction of the NFIRS 5.0 system and the resulting changes in cause definitions, some notable changes occurred. The leading cause of fires since 1996—replacing heating—was cooking, which reached its highest level in 2001. Even so, cooking fires decreased 12 percent over 10 years. Deaths from cooking, in third place, also reached a new high, and they increased by 19 percent. Cooking injuries, by far the leading cause of injuries in all years, increased slightly since its low point in 1999. Nevertheless, cooking injuries have declined 30 percent over the past 10 years.

Heating fires, which have sharply declined since the mid 1980s, reached its low point in 1998. In 1999, they began to rise. Nevertheless, heating fires, deaths, and injuries have trended down markedly over 10 years. Open flame fires replaced appliance fires in the top five list.

Although the curves for the leading causes of deaths in one- and two-family homes are erratic, the top five causes have not changed noticeably over 10 years with the exception of heating deaths, which has been replaced with open flame deaths among the top five. Smoking deaths dropped sharply in 1997 and have leveled off since then. It continues as the leading cause of fire deaths, though its trend declined by 21 percent. Arson fire deaths were the second leading cause and one of considerable concern to fire officials.

Injuries attributed to smoking declined 26 percent. Children playing trends have declined greatly on all fronts: fires and deaths, 61 percent each; injuries, 58 percent. These fires no longer are among the the top five in injuries.

¹¹ Several of the published studies of the effect of alcohol abuse on U.S. fires are cited in the “Resources” section at the end of Chapter 2.

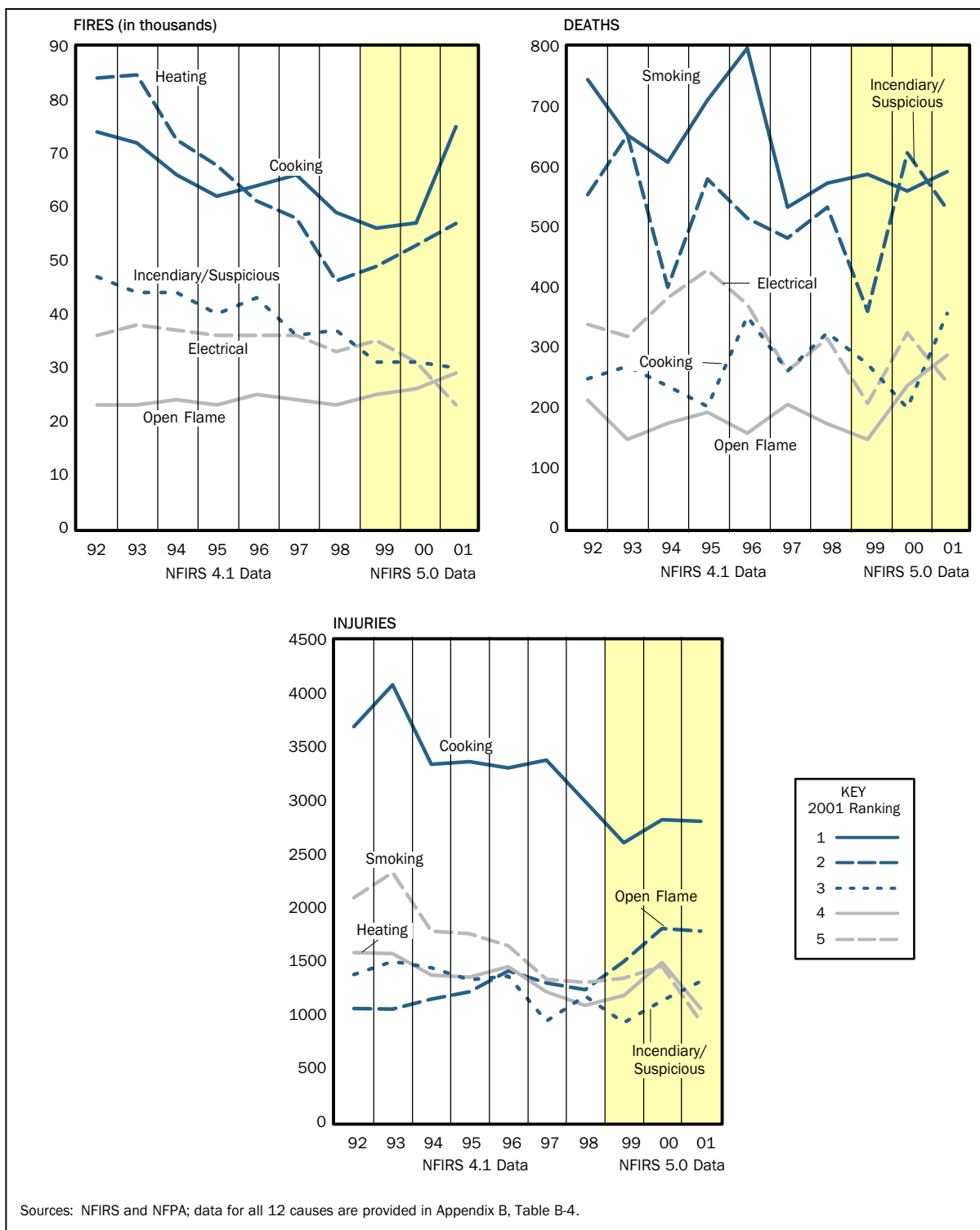


Figure 35. Trends in Leading Causes of One- and Two-Family Dwelling Fires and Fire Casualties

Table 14. Trends in Causes of One- and Two-Family Dwelling Fires and Casualties (1992–2001) (percent)

Cause	Fires	Deaths	Injuries
Incendiary/Suspicious	-36.7	-7.9	-24.9
Children Playing	-60.7	-60.8	-58.0
Smoking	-19.1	-20.5	-25.7
Heating	-44.0	-38.2	-52.0
Cooking	-12.2	+19.4	-30.4
Electrical Distribution	-24.8	-31.2	-44.4
Appliances	-22.3	-7.1	-14.7
Open Flame	+18.7	+38.8	+74.4
Other Heat	+135.7	+207.0	+112.2
Other Equipment	-11.0	+77.7	-11.8
Natural	+8.6	+35.4	+14.4
Exposure	+8.3	+90.2	+50.4

Sources: NFIRS and NFPA; data provided in Appendix B, Table B-4.

Area of Fire Origin

To help visualize the fire problem more personally, it is useful to describe it in terms of where different types of fires occur in the home and what types of fires occur in each room. Figure 36 shows the leading rooms where fires originate in one- and two-family homes in 2001. The rankings of the top three rooms for all three measures have remained unchanged since 1996. Kitchens, bedrooms, and lounge areas (e.g., living rooms, family rooms) are the rooms where most fires originate—50 percent of fires, 70 percent of deaths, and 66 percent of injuries (“unknowns” apportioned).

Two and one-half times as many fires occur in the kitchen as in any other area, obviously those caused by cooking. Half of all deaths occur in lounge areas and bedrooms, possibly because people fall asleep smoking in bed or on upholstered furniture, and 54 percent of injuries occur in the kitchen and bedroom.

Smoke Alarm Performance

In 2001, smoke alarms were present in 62 percent (“unknowns” apportioned) of homes that had reported fires (Figure 37); this is eight percentage points higher than in 1998. Alarms also were present in 54 percent of homes that had a fatality. In one-third of all fire death cases, the alarm operated, a troublesome statistic since alarms are purported to save lives. This may require further investigation.¹²

One- and two-family homes in which fires occur have, proportionally, fewer alarms installed than in apartments that experience fires. This may be because apartment smoke alarms are often provided by landlords and more often required by law than in single-family homes. (See page 87 for more on apartments.) Thirty-eight percent of all one- and two-family homes

¹²For example, were the victims physically unable to escape the blaze or were they simply not awakened by the sound of the alarm? Recent studies indicate that certain population segments (e.g., children) do not respond to alarms while in deep sleep.

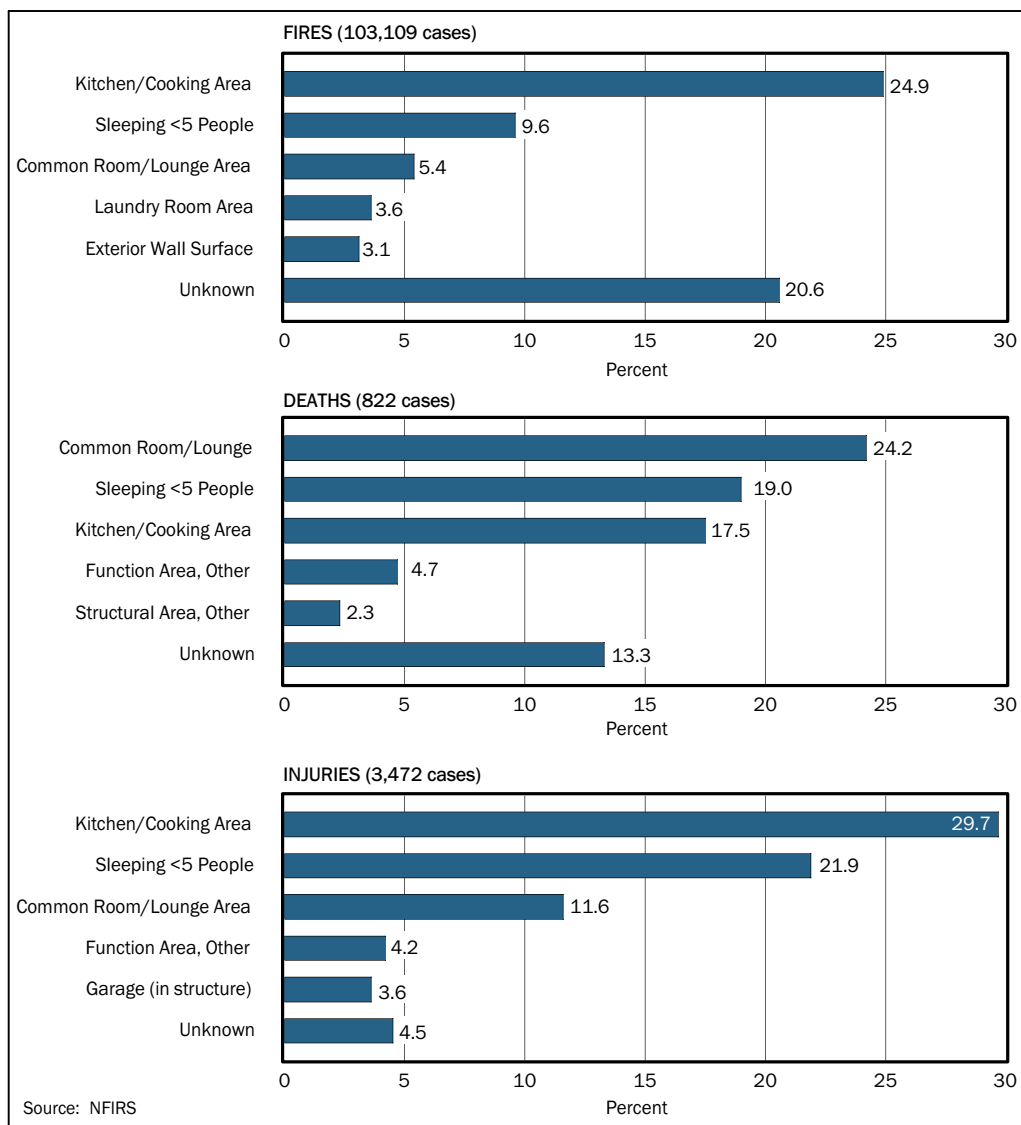


Figure 36. Leading Locations of Fire Origin in One- and Two-Family Structures (2001)

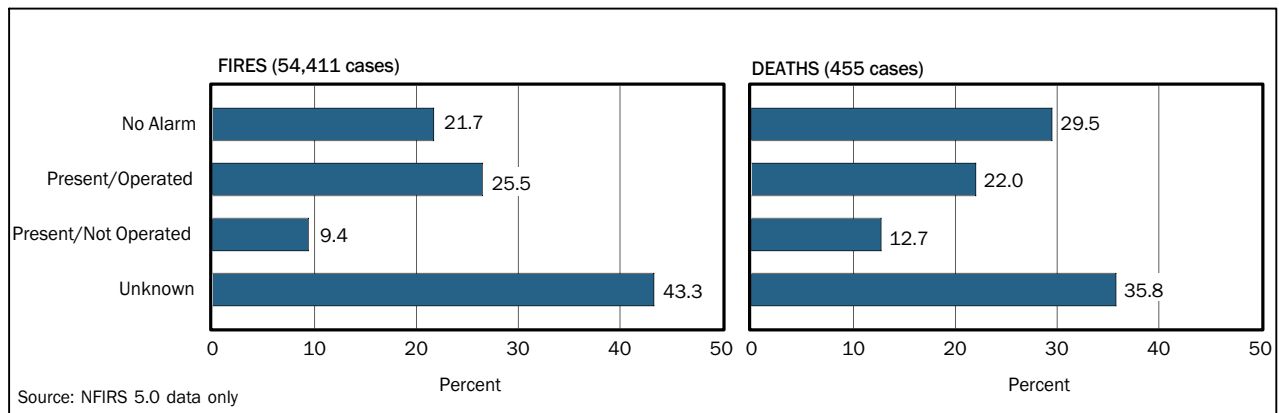


Figure 37. Smoke Alarm Performance in One- and Two-Family Structures (2001)

that had a reported fire had no smoke alarm installed in 2001, which is nearly three times greater than in apartments without alarms.

Presence of Automatic Extinguishing Systems

AESs were present in only 1 percent of fires and 2 percent of fatal fires in one- and two-family homes in 2001 (Figure 38). Although this is an insignificant amount from which to draw conclusions, the proportion of homes with AESs, such as sprinklers, nearly doubled over 1998 data (“unknowns” apportioned). Unlike the 1998 data in which only one death out of 1,010 was reported where an AES was installed, 9 deaths out of 455 were reported in the 2001 data. Further investigation into the 2001 results should be conducted.

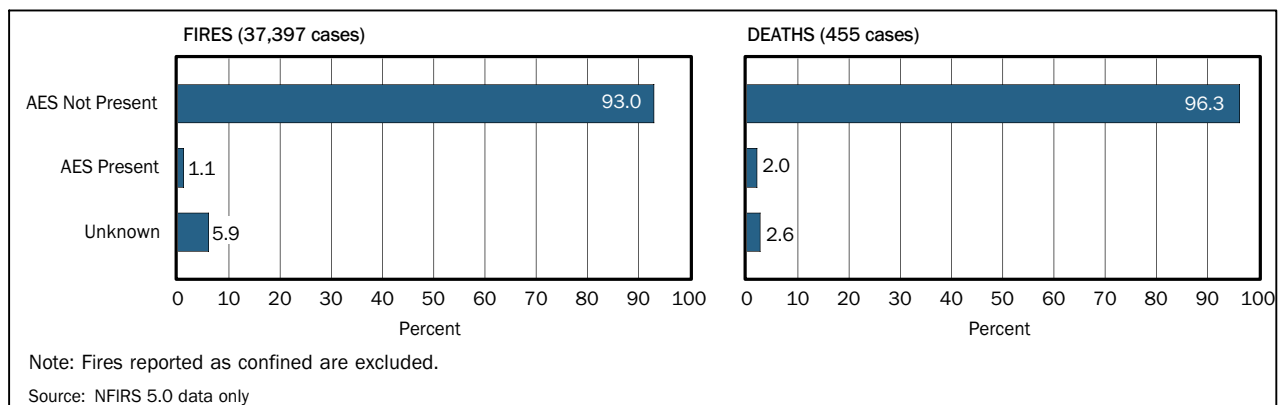


Figure 38. Presence of Automatic Extinguishing Systems in One- and Two-Family Structures (2001)

Mobile Homes Used as Fixed Residences

Today, the term *manufactured housing* includes many types of structures that are built and assembled under the controlled conditions of a factory. These structures are built to much higher standards than the mobile units of the early 1970s. Many of the noticeable distinctions between manufactured housing and standard (or “site-built”) housing are disappearing, as most manufactured housing is no longer single units in trailer parks, but double units placed on permanent foundations on private land.¹³ Retirement communities are springing up throughout the United States using manufactured homes as a way to keep costs to retirees at a minimum.

Prior to 1976, the most common type of factory-built housing was the mobile home. Mobile connotes what these homes were—a unit on a steel chassis that could be hooked to a tractor unit and moved. Historically, these units were placed on concrete blocks, many with the wheels still attached. This section deals only with mobile homes situated on semipermanent sites and used as fixed residences; this is a subcategory of one- and two-family structures. Although only 7

¹³ “A Few Facts About Manufactured Housing,” Federal Reserve Bank of Richmond, <http://www.rich.frb.org/cao/reports/housing.html>

percent of the U.S. population lives in manufactured housing,¹⁴ it has represented a severe fatality problem over the past 10 years—more than double the fatality rate per fire compared to other homes. This caused the U.S. Department of Housing and Urban Development (HUD) in 1976 to establish strict standards for improving the fire safety of such homes.

The HUD standard clearly made an impact. Although the fire problem in mobile homes used as fixed residences is still significant, Figure 39 shows large downward trends in fires (48 percent), deaths (57 percent), injuries (51 percent), and property loss (50 percent) even as the mobile housing stock has increased by 25 percent or more over the 10 years.¹⁵ These decreases are much sharper than the fire and casualty trend decreases in other single-family dwellings.

All of the reasons for these sharp declines are speculative. The 1976 HUD fire safety standards have played a part, causing manufacturers to incorporate more fire-resistant materials in these structures. More smoke alarms may be in use in mobile property housing. The decline might also have been affected by a change in behavior of the residents of mobile homes. This topic should be investigated more closely to determine whether lessons from improvements in the manufacture of mobile properties could be applied to other types of residences and to reinforce whatever is working.

Figure 40 shows the rate of deaths and injuries in mobile homes used as fixed residences. Deaths per 1,000 fires reached a low in 1998 with 13 deaths per 1,000 fires and highs in 1995 and 1996 with 27 deaths per 1,000 fires; the 10-year trend in deaths per fire decreased 15 percent. Injuries per 1,000 fires and dollar loss per fire also decreased modestly.

The 2001 cause profiles for mobile home fires and deaths are shown in Figure 41. Arson is the leading cause of fires, with heating, electrical distribution, open flame, and cooking close behind.

Other equipment (24 percent) and smoking (18 percent) are the leading causes of fire deaths in mobile structures. (Smoking is the leading cause of deaths in one- and two-family residences.) Smoking deaths in mobile properties used as fixed residences dropped from first in 1996 to sixth in 1998 and back to second in 2001. The reasons for the extreme shifts in year-to-year rank ordering of causes of deaths are because of the relatively few deaths reported (84) and the large number of unknowns (61 percent).

Figure 42 presents smoke alarm performance in mobile homes used as fixed residences. Overall, smoke alarms were present in six percentage points fewer than in one- and two-family residences (56 vs. 62 percent, apportioned) and their operation was in a similar proportion (38 vs. 45 percent). When present, smoke alarms operated in 68 percent of fires, somewhat higher than the 64 percent reported in 1998. Alarms were not installed in 44 percent of fires.

¹⁴ American Housing Survey, U.S. Census Bureau and Department of Housing and Urban Development, <http://www.census.gov/hhes/www/housing/ahs/ahs01-80/tab1a3.html>

¹⁵ Idem, <http://www.census.gov/prod/1/constr/h150/h150-93m.pdf>; <http://www2.census.gov/prod2/ahsscans/h150-91.pdf>; and <http://www.census.gov/hhes/www/housing/ahs/ahs01-80/tab1a3.html>.

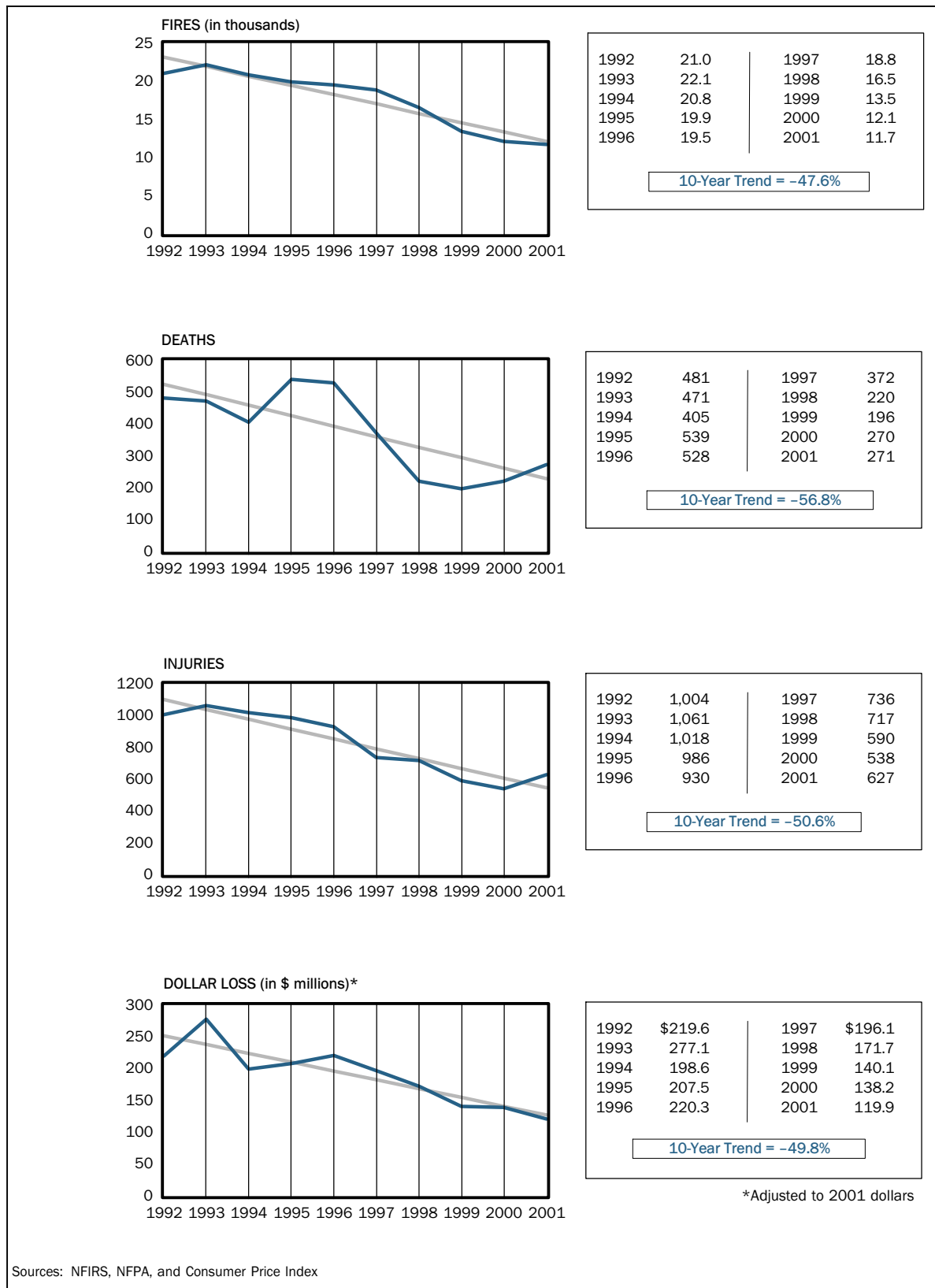
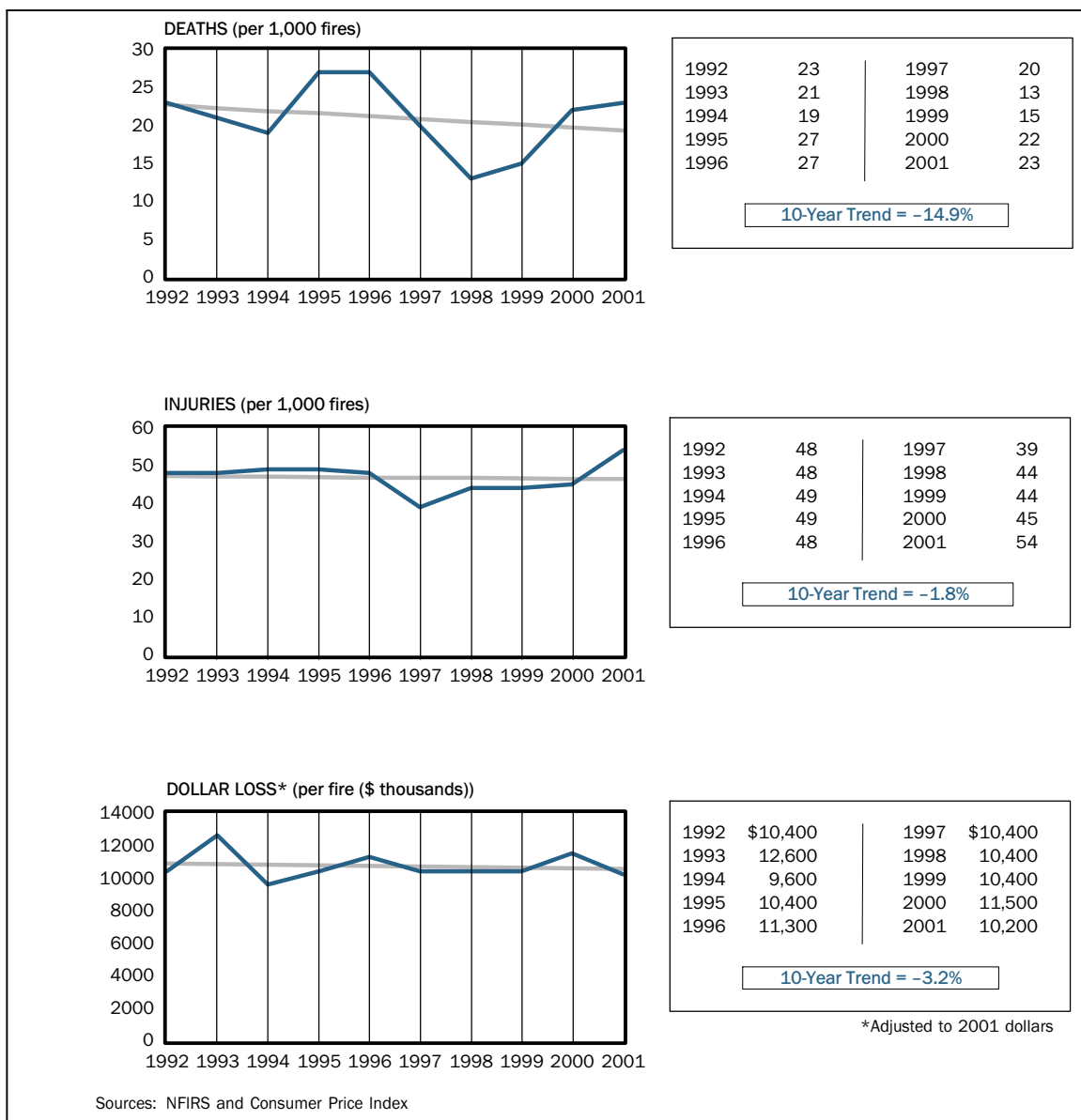


Figure 39. Trends in Fires and Fire Losses in Mobile Homes Used as Fixed Residences



**Figure 40. Trends in Casualty and Loss Rates in Mobile Homes
Used as Fixed Residences**

Moreover, in 62 percent of mobile structure fires, there were no operating alarms. No deaths were reported in 2001 where an alarm operated in the mobile property.

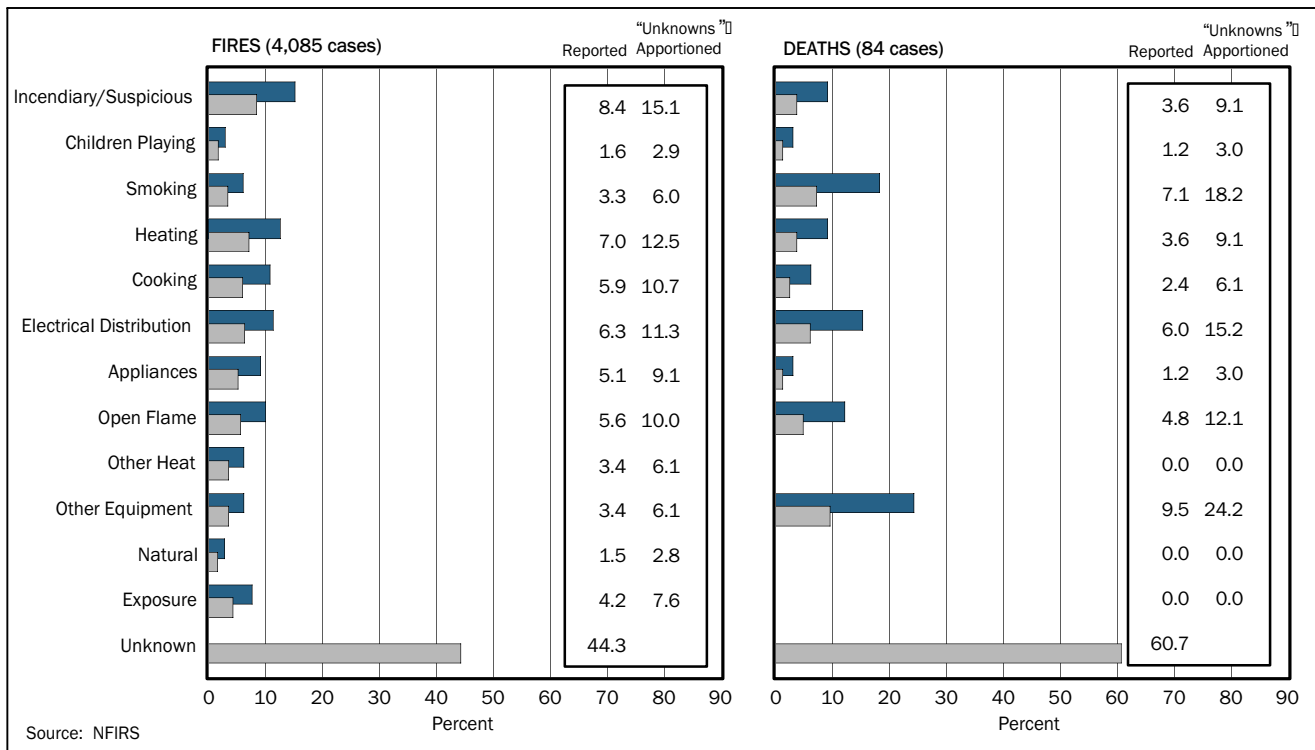


Figure 41. Causes of Fires and Fire Deaths in Mobile Homes Used as Fixed Residences (2001)

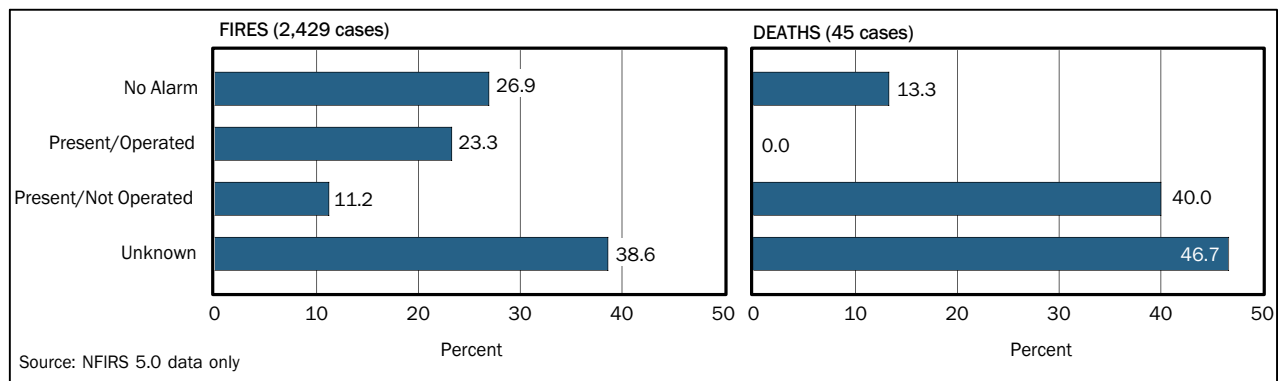


Figure 42. Smoke Alarm Performance in Mobile Homes Used as Fixed Residences (2001)

APARTMENTS

Multifamily dwellings, referred to as apartments in this report, tend to be more regulated by building codes than one- and two-family structures. Most apartments are rental properties, often falling under more stringent fire prevention statutes. In many communities, apartments also have a different socio-economic mix of residents compared to single-family dwellings. They may have more low-income families in housing projects or more high-income families in luxury highrises, or they may be centers of living for the elderly. In large cities, all of these groups are represented in apartments.

Because apartment buildings have large clusters of similar people, prevention programs can be specially tailored to the cause profiles of apartment buildings in different areas of the community.

Trends

Figure 43 shows the 10-year trends in apartment fires and losses. The number of apartment fires dropped 16 percent, whereas one- and two-family dwelling fires dropped at about one and one-half times this rate. The opposite was true of the death trend in apartments, which was down 26 percent, more than one and one-half times the trend in one- and two-family structures. The trend for injuries was down 33 percent, slightly higher than that of one- and two-family dwellings. Apartment fire injuries reached their lowest level in 2001. Adjusted dollar losses were up 14 percent in apartments, compared with a 4 percent increase in one- and two-family dwellings. Property losses in both types of structures reversed the downward trends shown in the previous 10-year period (1989–1998).

The steep declines in apartment deaths and injuries may be due to compliance with stricter building codes, the required presence of smoke alarms, and the increase in the number of sprinkler systems. More detailed study of socio-economic and demographic changes over time might reveal some of the factors involved in fire incidence.

Causes

The fire problem in apartments is generally similar to that of one- and two-family structures with the exception of one major category: heating-related fires. Because apartments generally have central heating systems that are professionally maintained, heating-related fires from misuse and poor maintenance are less in apartments than in single-family dwellings. This changes the proportions of the causes for apartments, with heating becoming less significant and the other causes moving up in importance.

In terms of numbers of reported fires in 2001, cooking in apartments leads by a factor of nearly five over the second leading cause (Figure 44). Cooking accounts for almost half of all apartment fires (but only one-quarter of one- and two-family residential fires). Cooking fires reached a 10-year high in 2001. As noted in previous discussions of cooking fires, this increase is largely the result of the addition of confined cooking fires. Arson is a distant second at 10 percent, and smoking third at 8 percent. The ranking of the top five leading causes of apartment fires has remained unchanged since 1994.

The leading cause of deaths in apartments is smoking, accounting for 35 percent of deaths. This is a higher proportion than in one- and two-family residences (22 percent). The second leading cause is arson (33 percent). These two causes account for two-thirds of all fire deaths in apartments; all other causes are relatively small.

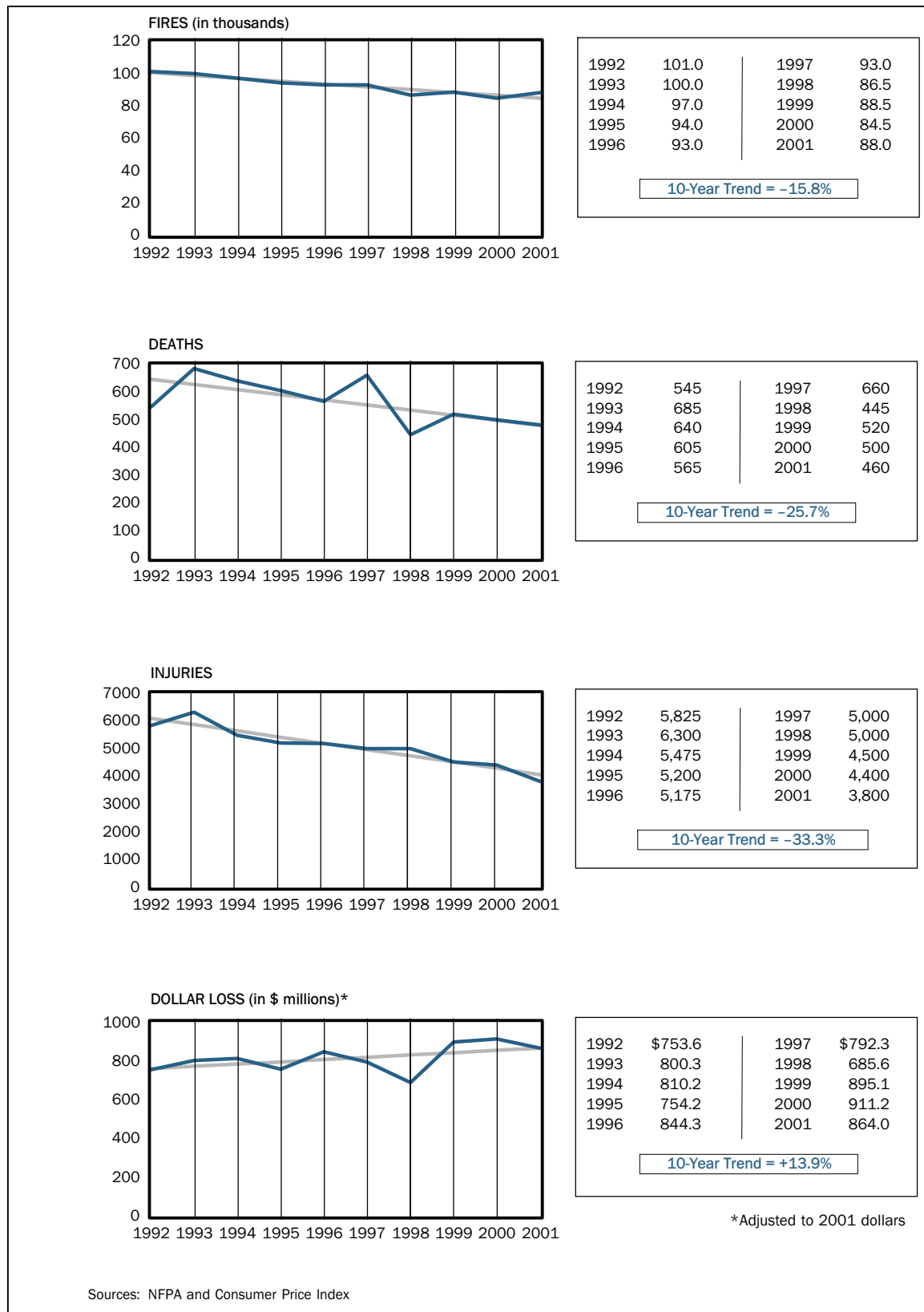


Figure 43. Trends in Apartment Fires and Fire Losses

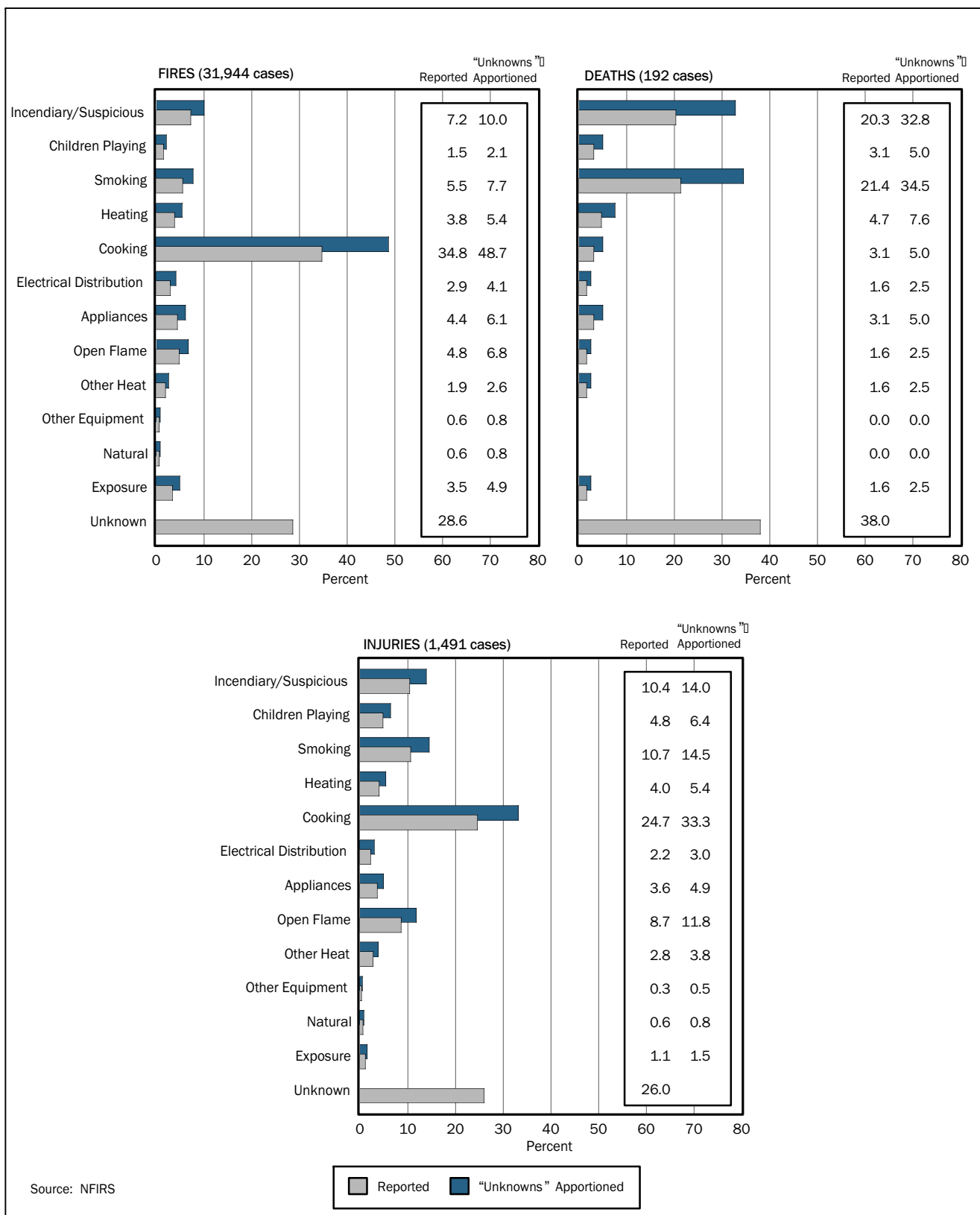


Figure 44. Causes of Apartment Fires and Fire Casualties (2001)

For fire injuries, cooking was first at 33 percent, smoking second at 15 percent, and arson third at 14 percent. The rankings of these three causes of injuries are identical to those in one- and two-family properties.

Although cooking in apartments represents nearly half of all fires and one-third of all injuries, relatively few apartment dwellers (5 percent) die in these incidents. This follows the same pattern as in one- and two-family residences and may reflect the general circumstances of cooking fires. Cooking fires tend to occur during the day or evening hours during meal times when most people are awake and responsive. Deaths are less likely under these circumstances.

Cause Trends

Figure 45 shows the trends in the five leading causes (in 2001) of apartment fires and casualties from 1992 to 2001. Table 15 shows the 10-year trends increases and decreases for each cause. The leading causes of apartment fires have shifted very little over the past 10 years. Cooking is still the leading cause of apartment fires and injuries but by widening margins since the introduction of the NFIRS 5.0 code changes. Smoking continues as the leading cause of apartment deaths, but it has sharply dropped since 1997; in fact, there were more arson-related deaths in 1999 than smoking deaths. Deaths from arson dropped sharply in 1998, but rose to its highest level the next year. In terms of injuries, four of the top five causes hit 10-year lows.

Except for arson deaths, all of the measures for the first six causes listed in Table 15 decreased, some sharply. Other heat and open flame fires and injuries increased substantially. The reason for the large decrease of natural fire deaths is because there were only 18 deaths over 10 years and no deaths were reported in 7 of those years.

The above data suggest that fire prevention programs aimed at apartment dwellers might emphasize the risks of fires associated with cooking and smoking. Further study on the arson problem in apartments would also be useful.

Smoke Alarm Performance

Smoke alarms were present in 86 percent ("unknowns" apportioned) of all apartment fires in 2001 (Figure 46). This is in contrast to one- and two-family dwelling where alarms were present in only 62 percent of fires. Smoke alarms are more likely to be installed in apartments, where they are provided by landlords, than in dwellings, where the occupants/owners provide and maintain them.

Smoke alarms were present and operating in 70 percent of fire deaths in apartments. Why alarms worked and people still died may be a subject for further study. In an apartment fire, more people will be at risk (e.g., 20 people in a hallway vs. 2.6 people in a one- or two-family dwelling). Another possibility is that hallway alarms or alarms in other apartments operated after the victims were overcome. Also, apartments have fewer ways to escape, especially apartments on higher floors. At night, escaping from an apartment can be particularly confusing when people

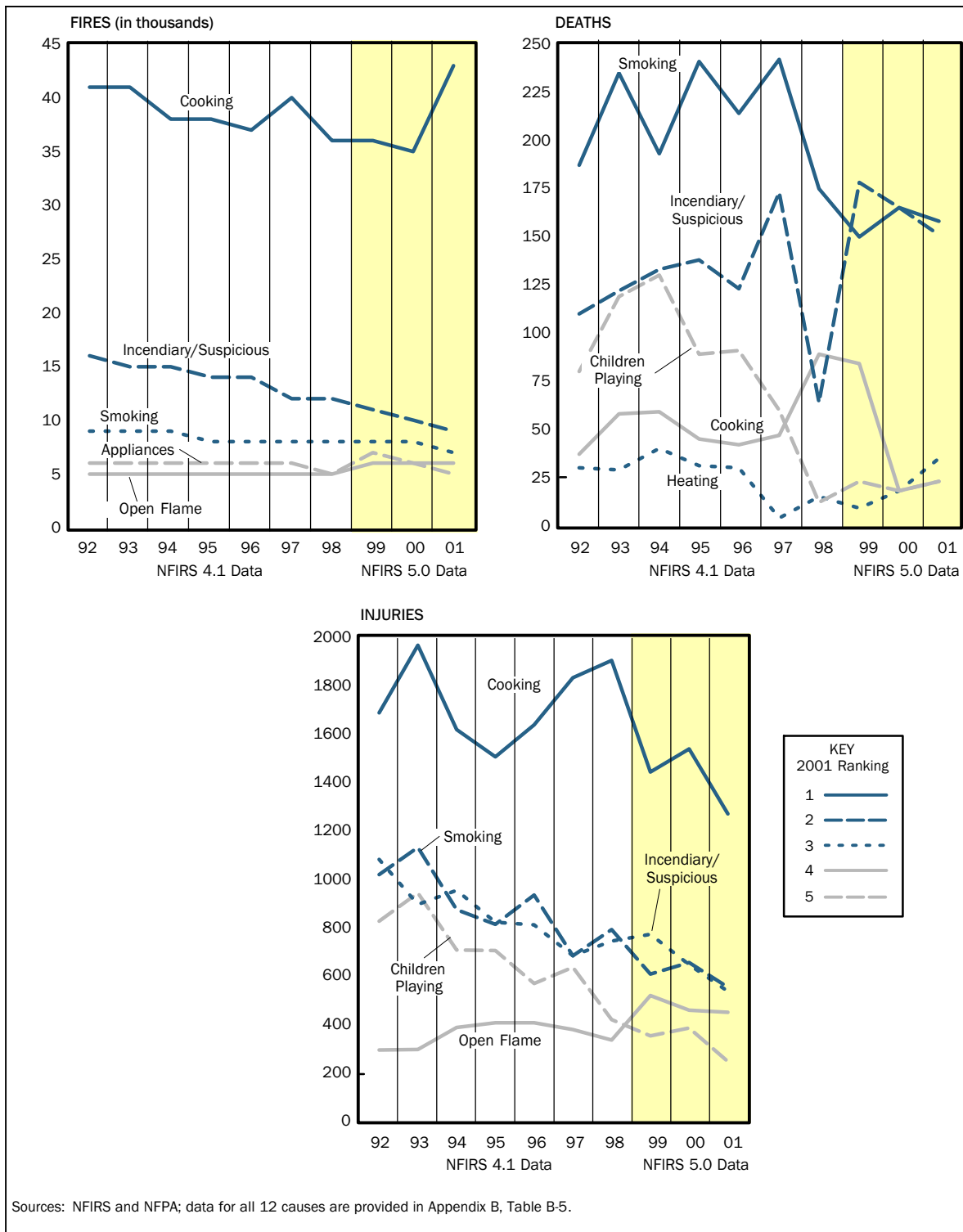


Figure 45. Trends in Leading Causes of Apartment Fires and Fire Casualties

Table 15. Trends in Causes of Apartment Fires and Casualties (1992–2001) (percent)

Cause	Fires	Deaths	Injuries
Incendiary/Suspicious	-41.4	+34.0	-42.9
Children Playing	-67.1	-92.6	-71.3
Smoking	-22.3	-27.3	-47.5
Heating	-22.9	-45.6	-30.9
Cooking	-5.4	-14.5	-18.9
Electrical Distribution	-25.9	-52.8	-42.1
Appliances	+3.9	+18.7	-23.0
Open Flame	+28.4	+31.7	+52.3
Other Heat	+75.0	-54.6	+72.0
Other Equipment	-50.3	-82.3	-54.6
Natural	+13.6	-750.0	+61.8
Exposure	+19.2	+7.2	-49.3

Sources: NFIRS and NFPA; data provided in Appendix B, Table B-5.

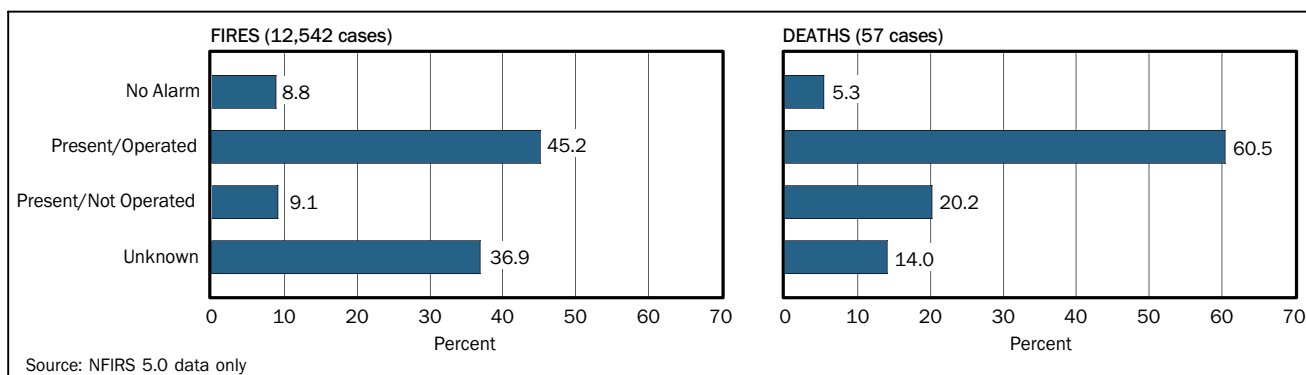


Figure 46. Smoke Alarm Performance in Apartments (2001)

are awakened suddenly. This situation suggests the need to emphasize fire prevention to apartment dwellers. Also, the installation of sprinkler systems could prove highly beneficial in apartments.

Smoke alarms were present but did not operate in 23 percent (“unknowns” apportioned) of apartments that had fire fatalities in 2001—a higher percentage than in one- and two-family dwellings having fatalities and alarms were nonoperative. This result is unexpected as apartment alarms are more likely to be hardwired into the electrical system and professionally maintained than alarms in dwellings.

Presence of Automatic Extinguishing Systems

Figure 47 shows the presence of AESs in apartments in 2001. As expected, a much higher percentage of apartments were equipped with sprinklers than in one- and two-family homes. The number of apartments that had reported fires and were equipped with sprinklers is virtually unchanged from 1998. This result is surprising since it is known that more newer apartments are

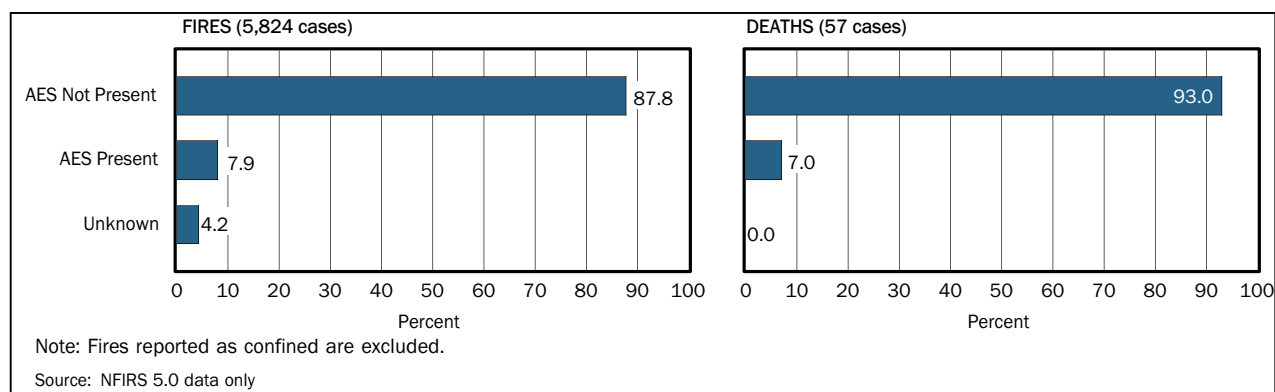


Figure 47. Presence of Automatic Extinguishing Systems in Apartments (2001)

equipped with sprinkler systems during construction. Perhaps the decline is a result of definitional changes in NFIRS reporting; also, the number of reported fires in 2001 is only one-third of those in 1998. NFIRS data does not report whether sprinklers were in the apartment of fire origin or in common areas such as hallways.

When Fires Occur

TIME OF DAY. Figure 48 shows the alarm times for fires, deaths, injuries, and dollar loss in apartment fires. The profiles are not as smooth as those for one- and two-family structures due to the smaller numbers of incidents involved.

As in one- and two-family residences, apartment fires peak during the evening cooking hours—here from 5:00 to 7:00 p.m.—and are at a lowest point from 4:00 to 6:00 a.m. The early morning hours from 1:00 to 4:00 a.m. are the most dangerous in terms of fire deaths, especially those associated with latent smoldering fires from smoking. The reason for the large spike in deaths at 8:00 a.m. is unknown.

Injuries are spread somewhat evenly throughout the day, generally rising from 6 a.m. throughout the day and falling at night. Dollar loss is similar to the injuries curve, except for the enormous spike reported at midnight. This spike results from a \$35 million fire in a New Hampshire motel that was being used as an apartment.

MONTH OF YEAR. Fires in apartments track closely with those in one- and two-family dwellings (Figure 49). They are somewhat more common in winter than in summer, perhaps because of heating fire problems in low-income apartments and increased indoor activity such as children playing. Other seasonal factors in addition to heating probably play a role in winter fires and deaths, such as the presence of dry Christmas trees, the use of holiday candles, or simply the greater propensity to stay indoors.

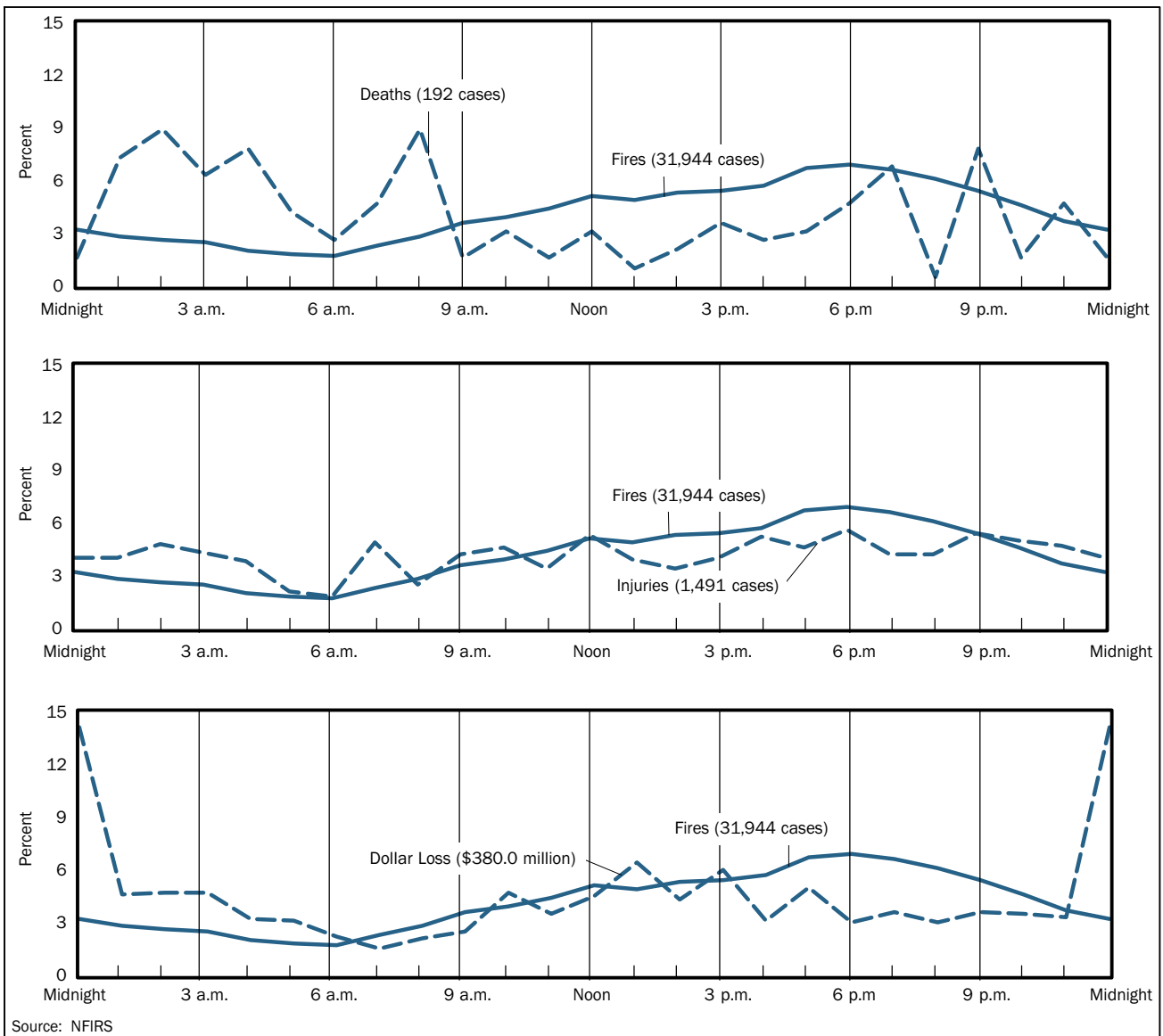


Figure 48. Time of Day of Apartment Fires and Fire Losses (2001)

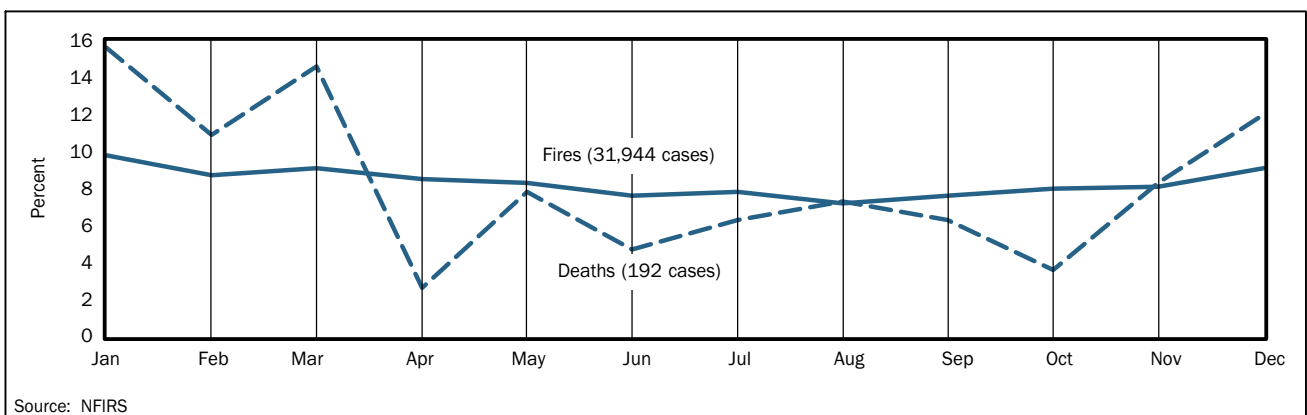


Figure 49. Month of Year of Apartment Fires and Fire Deaths (2001)

Room of Fire Origin

Figure 50 shows the leading rooms where apartment fires originated in 2001. As in every year, the kitchen is the most common place for a fire and injury, with cooking as the cause; bedrooms and lounge areas are the most common rooms where a fatal fire starts because of smoking on upholstered furniture, mattresses, or bedding. Although the leading apartment locations of all three measures are the same as in one- and two-family dwellings, apartment kitchens have twice the percentage of fires and nearly one and one-half times the percentage of injuries.

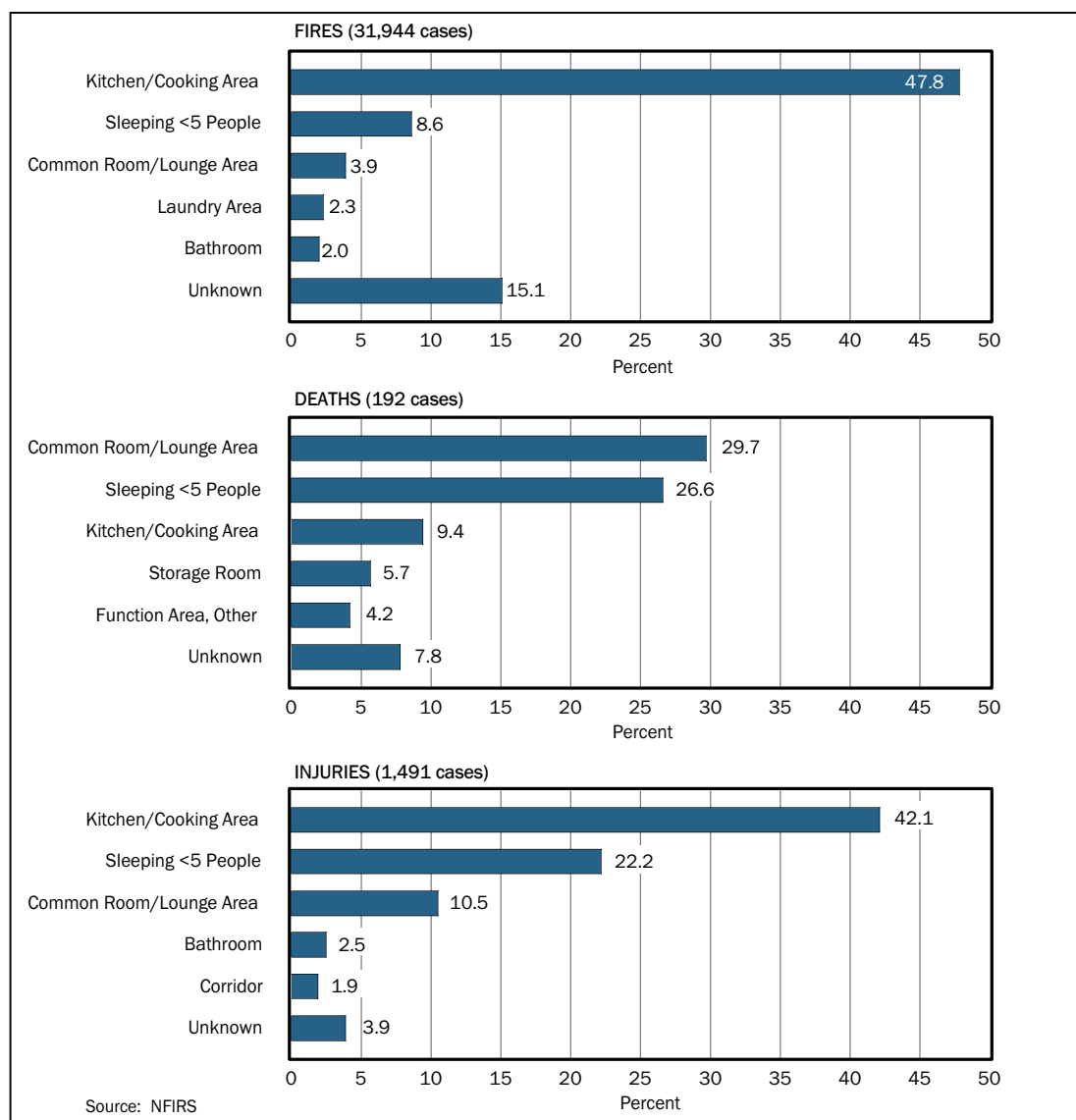


Figure 50. Leading Locations of Fire Origin of Apartment Fires and Fire Casualties (2001)

OTHER RESIDENTIAL PROPERTIES

Other residential properties include rooming houses, dormitories, home hotels, halfway houses, hotels and motels, and miscellaneous and unclassified properties reported as residences. Prior to 1994, the other residential properties category did not include hotels and motels in the yearly NFPA estimates of fires and fire losses; hotel/motel fires were reported separately. Since 1994, however, hotels and motels have been included as part of the other residential category. In this edition of *Fire in the United States*, other residential fires and fire losses have been recompiled to present a consistent series that includes hotels and motels. Therefore, the trends shown here are compatible only with the previous two editions of *Fire in the United States* (11th and 12th). The other residential properties category does not include homes for the elderly, prisons, orphanages, or other institutions; these have their own categories and are addressed in Chapter 4.

Trends

Figure 51 shows a slight 10-year decline (3 percent) in the number of other residential fires and large decreases in the number of deaths and injuries (76 and 34 percent, respectively). The 1993 spike in deaths is due to the Branch Davidian Compound fire in Waco, TX (47 deaths) and the Paxton “Hotel”¹⁶ fire in Chicago (20 deaths). Fire deaths ranged from 25 to 105 a year; injuries ranged from 375 to 600. Adjusted dollar loss has trended up 28 percent over 10 years, with lows of \$97 million in 1993 to a high of \$153 million in 2000.

Property Types

Figure 52 shows that hotels and motels in 2001 accounted for far more fires, injuries, and dollar loss than other residential property in this category, and tied with boarding/rooming houses for most deaths.¹⁷ The percentages for hotel/motel fires and losses are less than in 1998 for each of the four measures.

Causes

In 2001, cooking was the leading cause of fires, by a factor of three, in other residential properties (Figure 53). Arson was the leading cause of deaths and injuries, but because of the relatively small numbers of deaths and injuries, this cause does not stand out from the others. The cause of death was not reported in more than half of the cases.

¹⁶ This hotel was actually a permanent place of residence.

¹⁷ The “other” category tends to be a catchall category for any residential property that does not neatly fit into the main residential categories. It is unusually high in 2001.



Figure 51. Trends in Other Residential Property Fires and Fire Losses

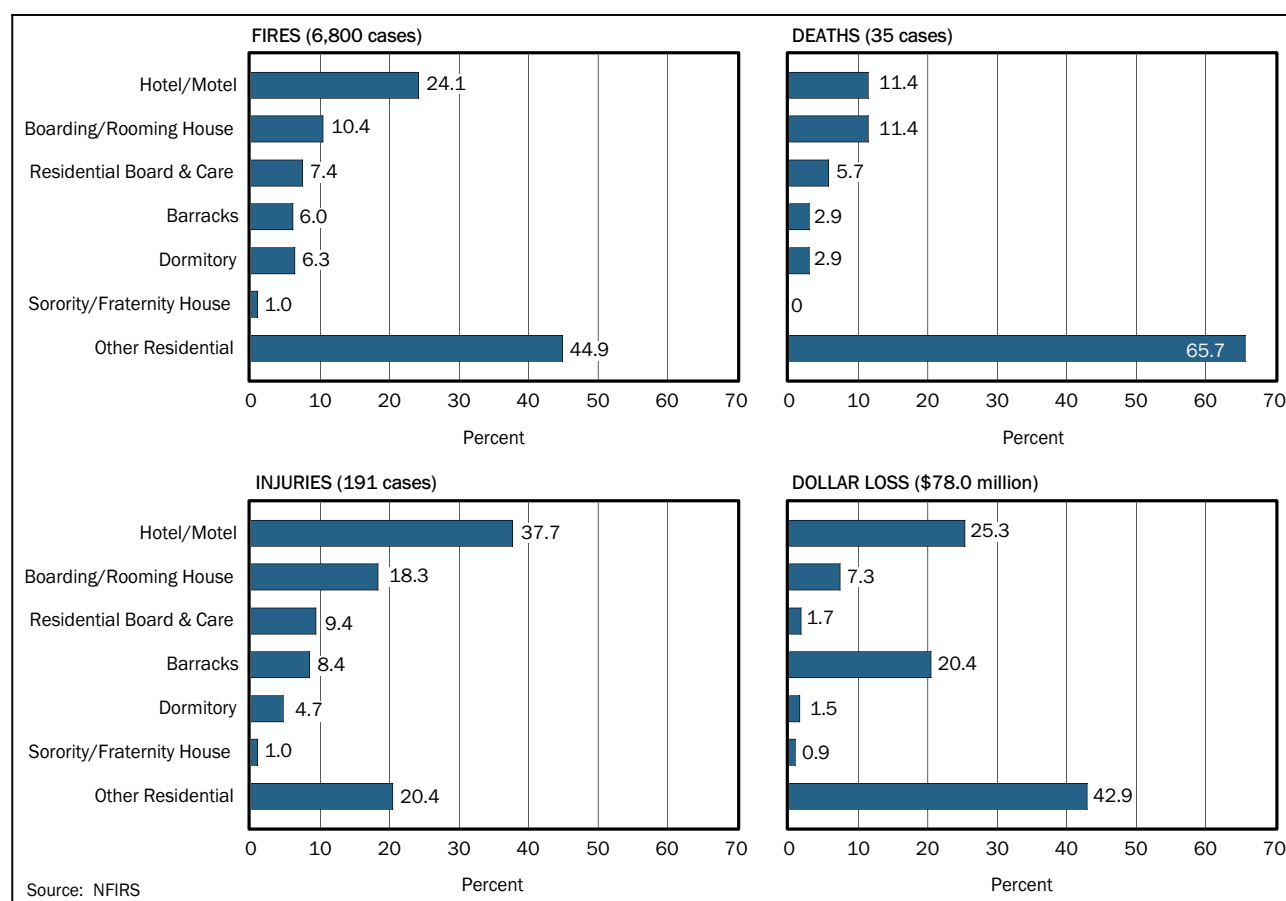


Figure 52. Other Residential Property Fires and Fire Losses by Property Type (2001)

Hotels and Motels

Because of the large reduction in the number of hotel and motel fires and fire losses, NFPA no longer tabulates this residential category separately. Although national numbers are no longer available for hotels and motels, NFIRS data are still tabulated separately and allow for the determination of the causes of hotel and motel fires, deaths, and injuries.

CAUSES. One-quarter of hotel/motel fires are from cooking, but these usually originate in the hotel's centralized restaurant, not in the guest rooms (Figure 54). Most other fires originate in guest rooms. Here, the leading causes tend to be careless acts that guests can commit in hotel rooms, such as smoking at 15 percent and appliance fires (e.g., hair dryers, irons, hot plates) at 13 percent. Some acts are intentional (arson at 13 percent) by employees or guests. Heating fires are less a cause in hotels than in other dwellings because heating systems are centralized and professionally maintained.

Only four hotel fire deaths were reported to NFIRS in 2001. One death was arson related, one was due to careless smoking, and the cause of two deaths was unknown.

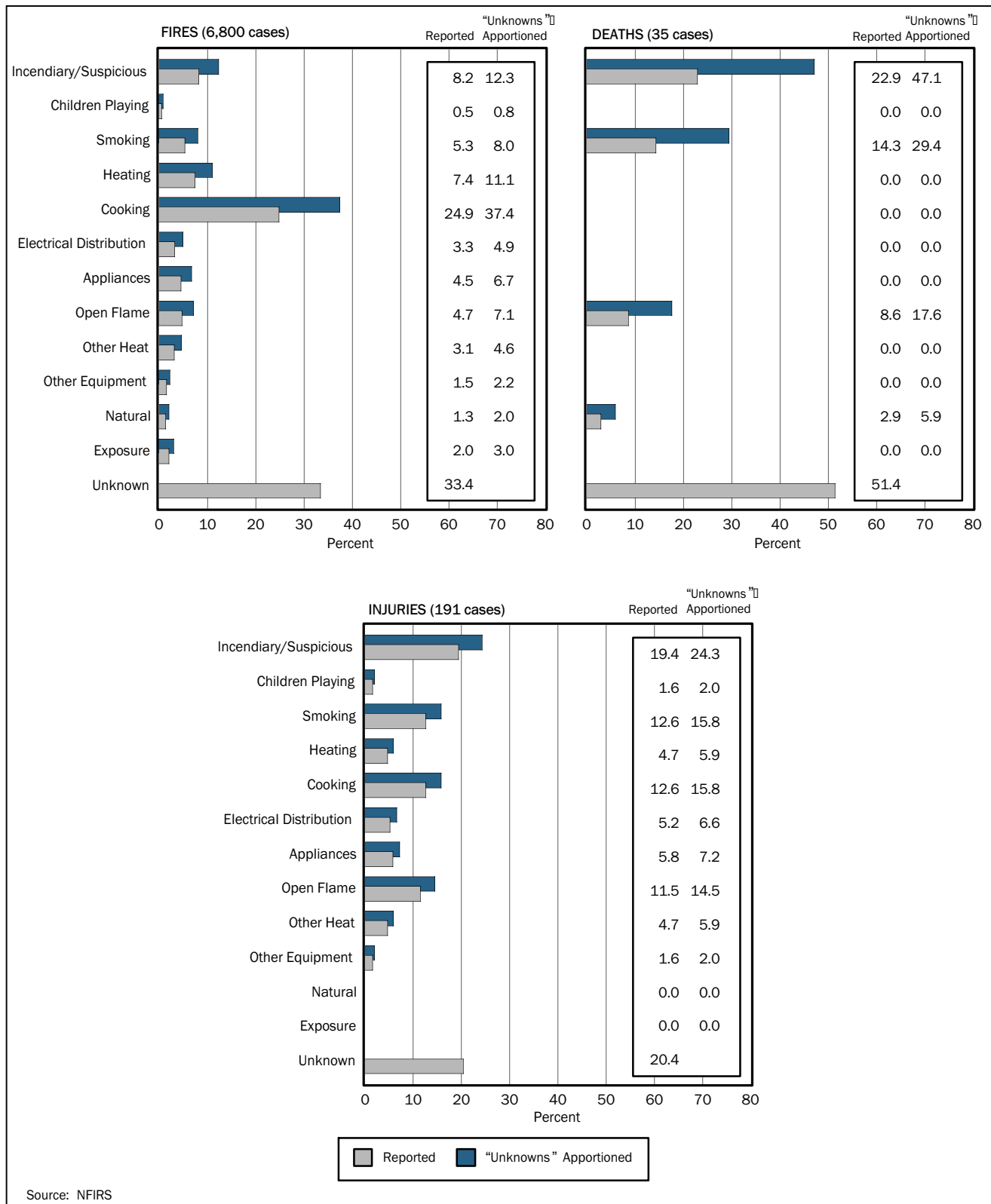


Figure 53. Causes of Other Residential Property Fires and Fire Casualties (2001)

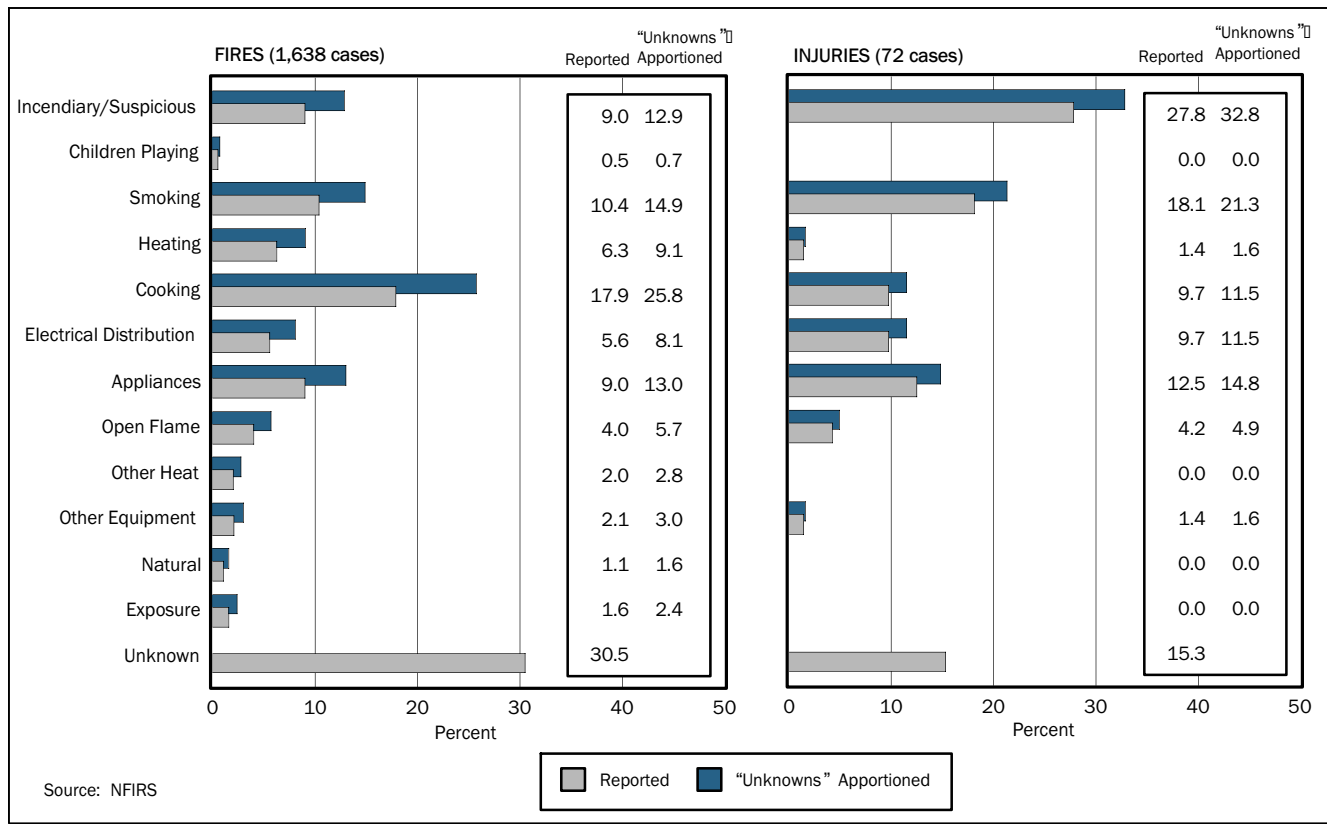


Figure 54. Causes of Hotel/Motel Fires and Fire Injuries (2001)

One-third of hotel/motel fire injuries were caused by arson. Smoking and appliance fires were the second and third leading causes of injuries.

TRENDS. Causes of hotel and motel fires, deaths, and injuries change from year to year because of the small numbers of fires, deaths, and injuries associated with this residential category. Table 16 compares the top three causes of fires, deaths, and injuries in 2001 with the three previous editions of *Fire in the United States*.

Although the causes shift from year to year, arson, smoking, cooking, and appliances are recurring causes in hotel and motel fires, deaths, and injuries. The hotel and motel industry has instituted major changes such as built-in fire protection systems and employee fire-awareness programs that have been instrumental in the overall decline of hotel and motel fire statistics.

Table 16. Leading Causes of Hotel and Motel Fires and Fire Casualties

Rank	1994	1996	1998	2001
FIRES				
1	Arson	Cooking	Cooking	Cooking
2	Cooking	Arson	Arson	Smoking
3	Appliances	Smoking	Appliances	Appliances
DEATHS				
1	Smoking	Smoking	Arson	Smoking/Arson
2	Cooking/ Electrical Distribution/ Other Heat	Arson	Electrical Distribution/ Other Heat	N/A
3	N/A	Other Equipment	N/A	N/A
INJURIES				
1	Smoking	Arson	Arson/Appliances	Arson
2	Arson	Smoking	Electrical Distribution	Smoking
3	Cooking	Appliances	N/A	Appliances

Source: NFIRS

USFA RESOURCES ON FIRES IN RESIDENCES

The vast majority of civilian fire deaths and injuries continue to occur in residences. Residential occupancies also account for the largest annual dollar loss, and more firefighter injuries occur fighting fires in residences than in any other property type. For these reasons, the USFA has a variety of initiatives that focus on reducing residential fires and the deaths and injuries that they cause.

Public fire education is a cornerstone of USFA's fire prevention programs. USFA continues to provide public fire education programs to the state and local levels by developing public education tools, public awareness campaigns, and technical materials. USFA also promotes school system acceptance of fire safety education in K–12 and encourages private sector commitment and support for community fire prevention.

Many of the following topics are addressed at USFA's Web site <http://www.usfa.fema.gov>.

Publications

To support and encourage public fire education, USFA has developed a series of public awareness campaign kits. Each campaign kit has a variety of high-quality, ready-to-use materials for use by educators, community organizations, fire departments, and the private sector. Most campaigns promote home fire safety, primarily in one- and two-family structures where 70–80 percent of residential fires, deaths, and dollar loss occur.

The USFA also produces a number of materials designed to improve the quantity and quality of public fire education efforts throughout the country. The *Directory of National Community Volun-*

teer Fire Prevention Programs (FA-92) is a catalog of local fire safety education programs addressing such issues as fire and burn prevention in the home, eliminating hazards, surviving and escaping fire, equipping the home with smoke alarms and fire extinguishers, and properly using home heating devices. *America Burning* and the updated version, *America Burning Revisited*, emphasize the importance of fire prevention and put it on the same level of importance as fire suppression. The *Juvenile Firesetter Intervention Handbook* (FA-210) offers concrete strategies on how to recognize a problem, interview children and their families, educate children not to set fires, and determine when a case calls for referral to a mental health professional. And finally, USFA offers the *Fire Safety Education Resource Directory* on line as a compendium of materials that may be useful in building and supplementing a public education program for fire safety: <http://www.usfa.fema.gov/applications/fserd>.

Many other valuable reports and books are produced and endorsed by USFA. The following list is by no means exhaustive, but it is intended to highlight some of the USFA literature not cited in other chapters:

- After the Fire! Returning to Normal* (English) (FA-46)
- After the Fire! Returning to Normal* (Spanish) (FA-46S)
- Beyond Solutions 2000*
- Children and Fire—A Growing Concern* (FA-244)
- Escape From Fire—Once You're Out Stay Out!* (FA-246)
- Fire Safety Checklist for Older Adults* (FA-221)
- Fire Safety Checklist for Older Adults—Spanish* (FA-221S)
- Get Out and Stay Alive*
- Get Out and Stay Alive Fire Safety Brochure for College Students* (L-234)
- Is Your Home Fire Safe? Door Knob Hanger* (L-227)
- Protecting Your Family from Fire* (English) (FA-130)
- Protecting Your Family from Fire* (Spanish) (FA-129)
- Rural Arson Control* (FA-87)
- Rural Fire Problem in the United States* (FA-180)
- Safety and Your Tree Holiday Hang Tag* (FEMA 024)
- Security (Burglar) Bars: Special Report* (USFA-TR-138)
- Solutions 2000*

The following children's publications pertaining to fire safety are:

- Let's Have Fun With Fire Safety: Exty and Hydro's Activity Book* (FA-189)
- Sesame Street Fire Safety Station* (FA-165)
- Sesame Street Fire Safety Station* (Spanish) (FA-165S)
- Sesame Street Fire Safety Station Color and Learn* (FA-176)
- Sesame Street Fire Safety Station Color and Learn* (Spanish) (FA-176S)

In addition to ordering through the online catalog, publications may be ordered by calling the Publications Center at (800) 561–3356 between 7:30 a.m. and 5:00 p.m. EST/EDT. To order publications by mail, write to:

Publications Center
United States Fire Administration
16825 South Seton Avenue
Emmitsburg, MD 21727

Please include your name, mailing address, daytime telephone number, date required, title(s) of the publication, and the quantity you need when ordering by phone or mail. Also, publications may be ordered online at <http://www.usfa.fema.gov/applications/publications>. Please include the parenthetical publication number, if given, in your request.

The Topical Fire Research series for the residential fires problem can be downloaded from <http://www.usfa.fema.gov/inside-usfa/nfdc/pubs/tfrs.shtm>, including:

- Candle Fires in Residential Structures
- Christmas/Christmas Tree Fires
- Dormitory Fires
- Fatal Fires
- Fraternity and Sorority House Fires
- Heating Fires in Residential Structures
- Highrise Fires
- Mattress and Bedding Fires in Residential Structures
- Multiple-Fatality Fires
- Portable Heating Fires in Residential Structures
- Residential Air Conditioning Fires
- Residential Structure Fires During the Winter Holiday Season
- Residential Structure Fires in 2000
- Residential Structure Fires on Agricultural Properties
- Smoke Alarm Performance in Residential Structure Fires
- Thanksgiving Day—Residential Structure Fires
- Winter Fires

Campaign Materials

The USFA has developed a series of public awareness campaign kits containing high-quality materials for use by educators, community organizations, fire departments, and the private sector. A public education initiative, *Fire Stops With You: USFA Fire Safety and Prevention Information (K–84)*, is a compilation of 5 years' worth of research that targets fire safety through empowerment: the individual's behavior is what must be addressed to prevent fire. It includes radio and print public service announcements (PSAs), factsheets, and technical reports.

Most campaigns promote home fire safety, primarily in one- and two-family houses. A recent campaign, *Spanish/English Home Fire Safety: Act On It*, was developed in cooperation with the

Sleep Products Safety Council, the National Association of Broadcasters, the National Board of Realtors, and the “Just Say No” campaign. It contains materials on general home fire safety themes, and includes radio and print PSAs, sample letters to the editor, a fill-in-the-blank press release, factsheets, and a resource guide. The factsheets and other fire safety information can be downloaded from <http://www.usfa.fema.gov/public/factsheets/safety.shtm>.¹

Major Fires Investigations

The USFA also conducts special studies to address specific problems and current issues facing the nation’s fire and rescue service. The technical reports produced under the Major Fires Investigations series analyze major or unusual fires with emphasis on sharing lessons learned. They are directed primarily at chief officers, training officers, fire marshals, and investigators as a resource for training and prevention.

ONE- AND TWO-FAMILY STRUCTURES:

Children Left Home Alone: Eleven Die in Two Fires, Detroit, MI, February 1993 (USFA–TR–070)
 Eight Children and Two Adults Die in Rural House Fire, Remer, MN, January 1989 (USFA–TR–028)
 Eight-Fatality Row House Fire: Lessons Learned from Residential Fires With Five or More Fatalities, Chester, PA, December 1992 (USFA–TR–067)
 Four House Fires That Killed 28 Children, September–December 1987 (USFA–TR–020)
 Multiple-Fatality Single Dwelling Fire (St. Cloud, FL) (USFA–TR–142)
 Nine-Fatality Mobile Home Fire, Maxton, NC, November 1989 (USFA–TR–037)
 Power Off to Hard-Wired Detector in Nine-Fatality House Fire, Peoria, IL, April 1989 (USFA–TR–031)
 Seven-Fatality Christmas Tree Fire, Canton, MI, December 1990 (USFA–TR–046)
 Seven-Fatality Fire at Remote Wilderness Lodge, Grand Marais, MN, July 1991 (USFA–TR–055)

APARTMENTS:

A Comparison of Two Fires: The Westview Towers (NJ) and the Council Towers Apartments (MO), (USFA–TR–119)
 Apartment Building Fire—East 50th Street, New York City, January 1988 (USFA–TR–019)
 Apartment Complex Fire, 66 Units Destroyed, Seattle, WA, September 1991 (USFA–TR–059)
 Fire, Police, and EMS Coordination at Apartment Building Explosion, New York City, November 1992 (USFA–TR–068)
 Kona Village Apartments Fire, Bremerton, WA, November 13, 1997 (USFA–TR–121)
 Multiple High-Rise Condominium Fire, Clearwater, FL, June 2002 (USFA–TR–148)
 Operational Considerations for Highrise Firefighting: Special Report (USFA–TR–082)
 Nine-Fatality Apartment House Fire, Ludington, MI, February 1993 (USFA–TR–072)
 Old Buckingham Station, Chesterfield, VA, May 1995 (USFA–TR–105)
 Schomberg Plaza Fire, New York City, Harlem, March 1987 (USFA–TR–004)

HOTELS AND MOTELS:

Doubletree Hotel Fire, New Orleans, LA, July 1987 (USFA–TR–008)
 Five-Fatality Residential Motel Fire, Thornton, CO, January 1997 (USFA–TR–104)
 LaPosada Hotel Fire, McAllen, TX, February 1987 (USFA–TR–001)

National Guard Plane Crash at Hotel Site, Evansville, IN, February 1992 (USFA–TR–064)
 Nine Elderly Fire Victims in Residential Hotel, Miami Beach, FL, April 1990 (USFA–TR–041)
 Ramada Inn Air Crash and Fire, Wayne Township, IN, October 1987 (USFA–TR–014)
 St. George Hotel Complex 16 Alarm Fire, Brooklyn, NY, August 26, 1995 (USFA–TR–108)

The USFA has worked diligently in the implementation of PL101–391, The Hotel/Motel Fire Safety Act of 1990. By working closely with the American Hotel and Motel Association and the National Association of State Fire Marshals, USFA provided a range of support services to states to help them identify facilities that meet the fire safety requirements of the Act. Links to these associations are at the USFA Web site (<http://www.usfa.fema.gov/applications/hotel>).

OTHER RESIDENTIAL PROPERTIES:

Class A Foam for Structural Firefighting (USFA–TR–083)
 College Dormitory Fires in Dover, Delaware, and Farmville, Virginia, April 1987 (USFA–TR–006)
 Compressed Air Foam Use for Structural Fire Fighting: A Field Test, Boston Fire Department, June 1993 (USFA–TR–074)
 Fire Safe Student Housing: A Guide for Campus Housing Administrators (FA–228)
 Get Out and Stay Alive Fire Safety Brochure for College Students (L–234)
 Hospital Fire Kills Four Patients, Southside Regional Medical Center, Petersburg, VA, December 1994 (USFA–TR–080)
 Shenandoah Retirement Home Fire, Roanoke County, VA, December 1989 (USFA–TR–038)
 Sixteen-Fatality Fire in Highrise Residence for the Elderly, Johnson City, TN, December 1989 (USFA–TR–039)
 Success Story at Retirement Home Fire, Sterling, VA, December 1989 (USFA–TR–040)
 Ten Elderly Victims From Intermediate Care Facility Fire, Colorado Springs, CO, March 1991 (USFA–TR–050)
 Ten-Fatality Board and Care Facility Fire, Detroit, MI, June 1992 (USFA–TR–066)
 Twelve-Fatality Nursing Home Fire, Norfolk, VA, October 1989 (USFA–TR–034)
 Two-Fatality Board and Care Facility Fire, Salvation Army Rehabilitation Center, Miami, FL, November 1995 (USFA–TR–090)
 Winter Fires—Safety Tips for the Home (FA–249)

Residential Sprinklers

The USFA has done extensive research to develop installation and application standards for quick-acting residential sprinklers and has conducted a variety of demonstrations of the quick-response sprinkler technology to demonstrate the practicality of these systems. The USFA also worked with the National Institute of Standards and Technology to design and test new limited-water-supply fire sprinkler systems for residential housing.

Home Fire Protection—Residential Fire Sprinkler Systems (FA–43) is a pamphlet for the general public explaining the merits of home sprinklers and the financial and insurance benefits. The brochure *New Home Construction and Life Safety Sprinklers* (FA–258) also provides useful information on the benefits of home sprinkler systems.

Other USFA reports on residential sprinklers include:

Backflow Protection for Residential Sprinkler Systems

Evaluating Small Board and Care Homes: Sprinklered vs. Nonsprinklered Fire Protection

Residential Sprinkler Retro Demo Case Study (FA–90)

Review of Residential Sprinkler Systems: Research and Standards (FA–265)